TECHNOLOGY DEPT.

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Construction Methods and Equipment

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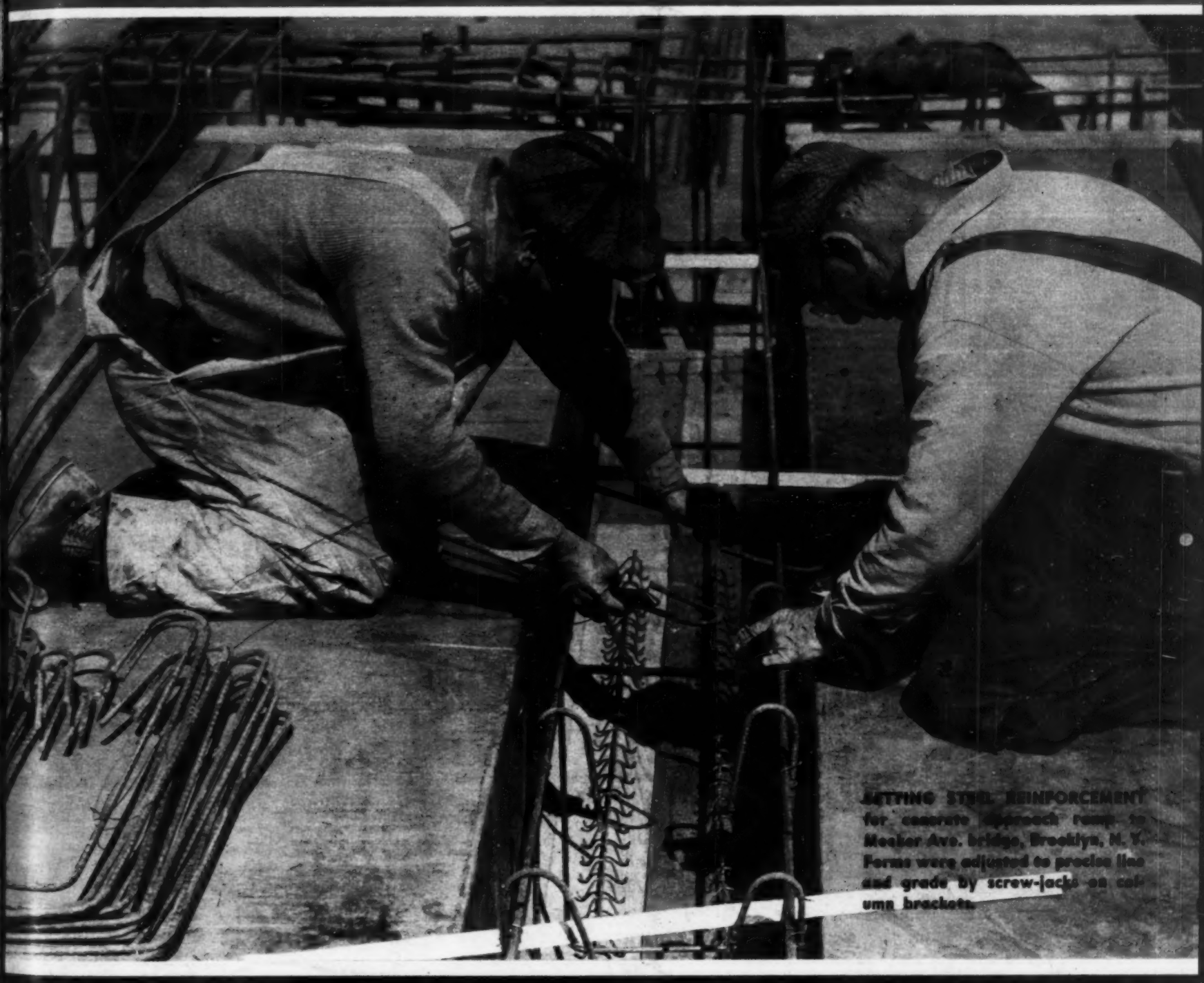

SETTING STEEL REINFORCEMENT for concrete approach ramp to Meeker Ave. bridge, Brooklyn, N. Y. Forms were adjusted to precise line and grade by screw-jacks on column brackets.

In This Issue

LARGEST HOUSING PROJECT in United States includes group of 51 apartment buildings (7 to 10 stories) containing 42,000 rooms, under construction in New York City for Metropolitan Life Insurance Co. Cinder concrete for floor arches is handled by fleet of 9 truck-mixers.

MOBILE TIMBER FALSEWORK carried plywood-lined forms for concrete barrel arches of 196-ft. span for George Washington bridge approach.

OVERSEAS HIGHWAY along Florida Keys required revamping of old railway bridges into structures carrying 20-ft. roadway decks on concrete arches and steel plate girders. Steel frame traveler on rubber-tired wheels aided form setting.

BATTERY OF 222 SCREW-JACKS on temporary column brackets was used by contractor to set and adjust forms for concrete ramp approach to Meeker Ave. bridge, Brooklyn, N. Y. Metal pans were used to form reinforced concrete deck.

Section S-5 showing Inland Hi-Steel rib construction.

Contractor, Herlihy Mid-Continent Co., Chicago.

Chicago's New Subway Takes Shape

with Special Steel Sections Made by INLAND

● Tunneling for Chicago's new subway goes forward rapidly—and here again Inland engineers have co-operated from the early planning stages.

After a thorough study of the problem, special I-Beam arch ribs and liner plates were designed for the job by Inland engineers—permitting quicker setup and a less costly method of sustaining earth pressures prior to the placing of concrete. Plates were designed and tested for pressures of 4,000 lbs. per square foot.

Liner plates and ribs transmit pressure into trusses, held apart by timber cross braces, placed high enough to allow ample working space. Trusses are made of Inland Hi-Steel (high strength low-alloy), to keep weight to a minimum so that they may be erected and moved by hand during tunneling operations.

Inland engineers, working closely with the contractors, have helped them develop a safe and economical method of handling this part of the job. This practical co-operation is typical of Inland and is a good indication of the engineering service you can expect from Inland on any type of construction work involving the use of steel.

TECHNOLOGY DEPT.

INLAND STEEL CO.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

CURRENT JOBS

. . . . and Who's Doing Them

HIGHWAYS

The Pennsylvania Turnpike Commission, of Harrisburg, Pa., has been active in receiving bids and letting contracts for the 160-mi. super highway between Harrisburg and Pittsburgh as follows: $2,055,940 to **B. Perini & Sons,** of Framingham, Mass., for Tuscarora Mt. tunnel; $496,532 to **M. Bennett & Sons,** of Indiana, Pa., for highway construction; $709,957 to **Guthrie-Marsch-Peterson Co.,** of Chicago, for highway construction; $731,467 to **C. J. Langenfelder & Son,** of Rosedale, Md.; $616,596 to **George Vang, Inc.,** of Pittsburgh, for grading and reinforced concrete structures; $699,588 to **A. Eidenmiller,** of Greensburg, Pa., for road construction; $354,072 to **McCrady Construction Co.,** of Pittsburgh, for road construction; $866,072 to **Walker Bros.,** of Chambersburg, Pa., for 10 mi. of paving; $234,593 to **Dalton Bros., Inc.,** of Paoli, Pa., for grading and drainage; $287,833 to **H. W. Shaull & Son,** of Mechanicsburg, Pa., for grading and drainage; $1,561,920 to **Central Pennsylvania Quarry, Stripping and Construction Co.,** of Hazleton, Pa., for grading and structures; $415,736 to **Baldwin Bros. Paving Co.,** of Cleveland, Ohio, for grading and structures; $642,295 to **Connell & Laub Construction Co.,** of Somerset, Pa., for grading and drainage; $489,540 to **Ferguson & Edmondson Co.,** of Pittsburgh, for grading and structures.

BUILDINGS

Public — Slum clearance and mass housing project in Memphis, Tenn., to cost $2,785,362, has been started by **S. & W. Construction Co.,** local contractor. Low bidder for the Taft high school in New York City, totaling $2,184,000, was received from **Wilaka Construction Co.,** of New York. In Montgomery, Ala., a Veterans building will be constructed by **Algernon Blair,** of Montgomery, for $1,042,917. Successful bidders for a state library building in Richmond, Va., were **Doyle & Russell,** local contractors, with a tender of $1,148,770. In Cleveland, Ohio, construction on the Woodhill Homes project to cost $1,763,920, has been started by **Hunkin-Conkey Construction Co.,** of Cleveland. A low bid of $1,173,000 for the Bedford housing project in Pittsburgh, Pa., was submitted by **James Ring Construction Co.,** of Minneapolis. Re-housing project in Knoxville, Tenn., went to **McGill & Daugherty** and **A. H. Whisman Co.,** local contractors for $975,000. Cell blocks for a jail in Washington, D. C., were awarded to **J. McShane, Inc.,** of Baltimore, for $972,000. Research laboratory in Peoria, Ill., will be built by **W. E. O'Neil Construction Co.,** of Chicago, for $885 000. A federal agricultural laboratory in New Orleans, La., was awarded to **A. J. Rife Construction Co.,** of Dallas, Tex., for $843,000. **McDonald & Kahn Co.,** of San Francisco, were successful bidders for an $817,000 federal research laboratory in Albany, Calif. A housing project comprising 352 dwelling units, to cost $737,659, is under construction in Miami, Fla., by **Fred Howland, Inc.,** local contractor. Cell block for jail at Elmira, N. Y., was bid in by **C. F. Haglin & Sons** and **Winston Bros. Co.,** of Buffalo, for $657,700. University building at Urbana, Ill., was awarded to **English Bros.,** of Champaign, Ill., for $682,900. **V. P. Loftis,** Charlotte, N. C., will build a $472,000 state hospital at Morganton, N. C. A new civic center building in Great Falls, Mont., to cost $465,420 is under construction by **J. C. Boespflug,** of Miles City, Mont. For hospital dormitory buildings at Pueblo, Colo., bid of $568,477 obtained contract for **Thomas Bate & Son,** of Denver.

Industrial — For the Scott Paper Co., at Chester, Pa., **Stone & Webster,** of New York City, are building a $1,500,000 paper manufacturing plant. A factory at Blue Ridge, Ga., to cost $500,000 is under construction by **Gillmore-Carmichael-Olson Co.,** of Cleveland, Ohio.

Commercial — Hospital for crippled children at Wilmington, Del., was awarded to **George A. Fuller Co.,** of Washington, D. C., for $600,000. College buildings at Leavenworth, Kan., went to **Dunn Construction Co.,** of Kansas City, Mo., for $500,000. A $500,000 home development in West Orange, N. J., is under way by the **Baldwin Construction Co.,** of East Orange.

WATERWORKS AND SEWERS

Sewage disposal plant at Springfield, Mass., will be built for $1,078,208 by **Caye Construction Co.,** of Brooklyn, N. Y. Branch of Kirkwood Street sewer in Pittsburgh, Pa., costing $478,375 is under construction by **M. Manella,** local contractor. Clearwater, Fla., has awarded $188,956 sewer contract to **Ebersbach Construction Co.,** of Tampa. In St. Joseph, Mo., **W. B. Carter** has a $169,820 sewer contract. **Smith-Pew Construction Co.,** of Atlanta, Ga., is building a $183,328 sewer in Middleboro, Ky.

Dam and reservoir for Bethlehem, Pa., to cost $1,641,656 are under construction by **C. W. Good,** of Reading, Pa. Water supply tunnels in Chicago went to **Wenzel-Henoch Co.,** of Milwaukee, Wis., for $1,589,200. In Asheboro, N. C., **A. H. Guion Co.,** of Charlotte, N. C., is building a $106,900 water works plant. Owensboro, Ky., has let a $280,890 river intake contract to **Foundation Co.,** of New York City.

BRIDGES

Contract for superstructure for Susquehanna River bridge at Havre de Grace, Md., went to **Bethlehem Steel Co.,** of Bethlehem, Pa., for $2,469,300. **Harris Structural Steel Co.,** of New York City, with price of $1,975,516 was successful bidder for superstructure of Potomac River bridge at Ludlows Ferry, Md. Superstructure for Mississippi River bridge, at Greenville, Miss., went to **American Bridge Co.,** of Cincinnati, Ohio, for $1,631,130. Viaduct on East River Drive, New York City, was bid in for $1,420,000, by **Poirier & McLane,** local contractors. At Natchez, Miss., **Bethlehem Steel Co.,** of Bethlehem, Pa., will erect superstructure for Mississippi River bridge at cost of $1,274,240. In Brooklyn, N. Y., **P. T. Cox Contracting Co.,** of New York City, was awarded $1,051,225 contract for Shore Parkway viaduct.

Construction Methods and Equipment

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JULY, 1939

ROBERT K. TOMLIN, Editor
A. E. PAXTON, Manager

Editorial Staff: Vincent B. Smith, Paul Wooton (Washington), Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The "How" of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How VITRIFIED BLOCK PAVEMENT was reinforced with steel rods and bar mats. — p. 39
How CINDER CONCRETE for floor arches of apartment building group was mixed and delivered by truck-mixers. — p. 42
How BULK CEMENT, discharged from end-dump truck, was raised to bins by bucket elevator. — p. 43
How BUCKET HOIST TOWER lifted cinder concrete to floor levels of apartments. — p. 45
How SCREW-JACKS on column brackets set and adjusted forms for bridge ramp. — p. 46
How SPECIAL TEMPLET insured proper spacing of bolt holes for column brackets. — p. 47
How MOBILE TIMBER FALSEWORK was used to build concrete arches of 196-ft. span. — p. 48
How CORDUROY BASE supported World's Fair road on meadow muck. — p. 52
How ELECTRIC HAND TOOLS sawed and drilled lumber for corduroy road base. — p. 53
How SALVAGED DRILL STEEL was welded to form attractive andirons. — p. 55
How SPLIT RING CONNECTORS insured strong joints in 450-ft. timber arch centering. — p. 58
How PORTABLE PIPE THREADER was used effectively in building aircraft factory. — p. 58
How DREDGE PIPE was set quickly by wooden A-frame on rear end of truck. — p. 58
How TEMPORARY BARRICADE to protect street excavations was made of planks and C-clamps. — p. 59
How DIESEL PULL-SHOVEL dug trench for water main. — p. 59
How PREFABRICATED TIMBER BRIDGE was erected with aid of metal connectors. — p. 62
How CARRIER SCRAPERS moved earth for road grading. — p. 64
How LEAKING TILE SEWER was replaced by line of corrugated metal pipe. — p. 66
How RAILWAY BRIDGES were revamped to carry highway traffic over Florida Keys. — p. 68
How STEEL FRAME TRAVELER on wheels was used to set forms for bridge reconstruction. — p. 70
How CHANNEL BANKS were protected by paving of grouted rock. — p. 72

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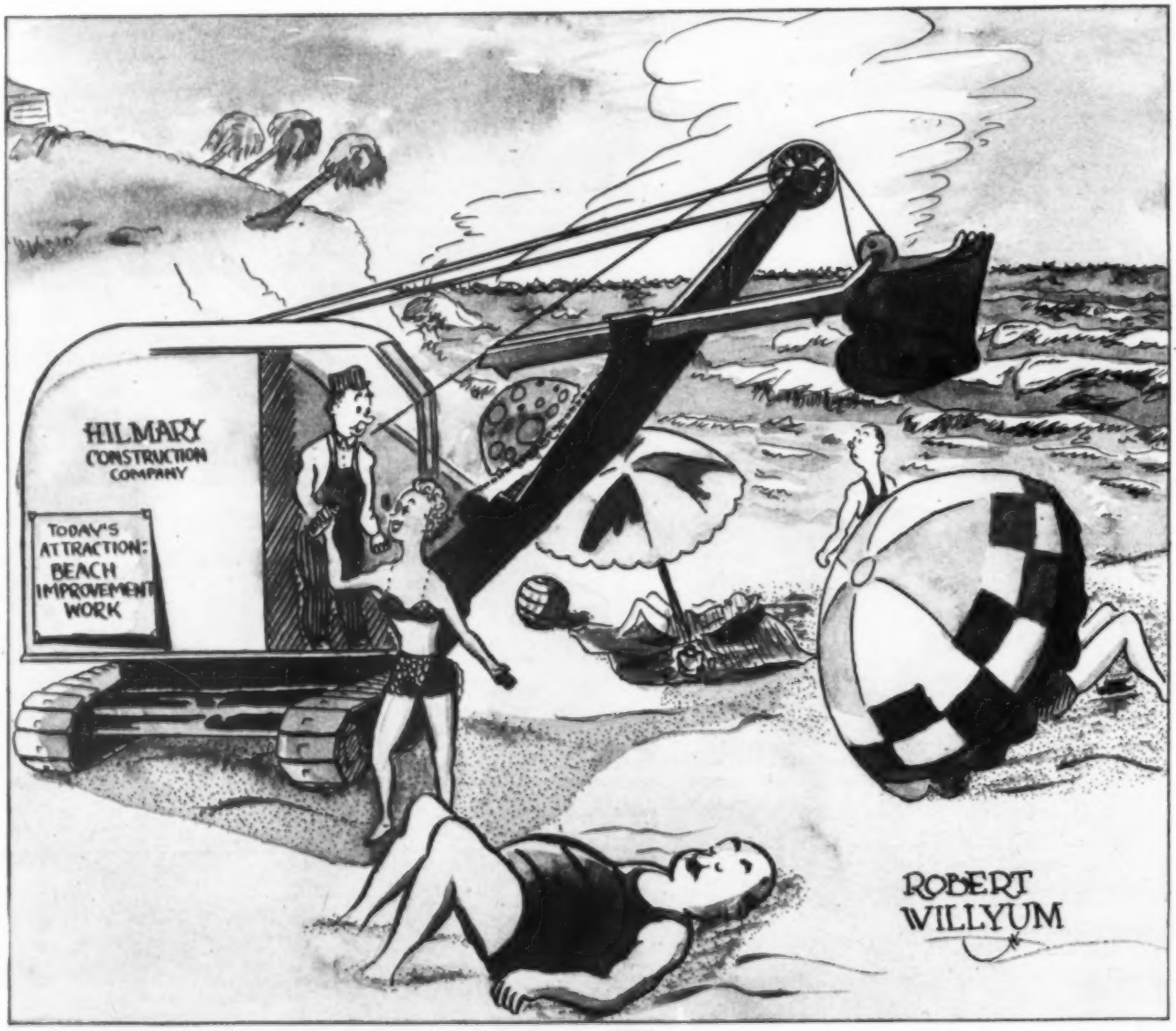
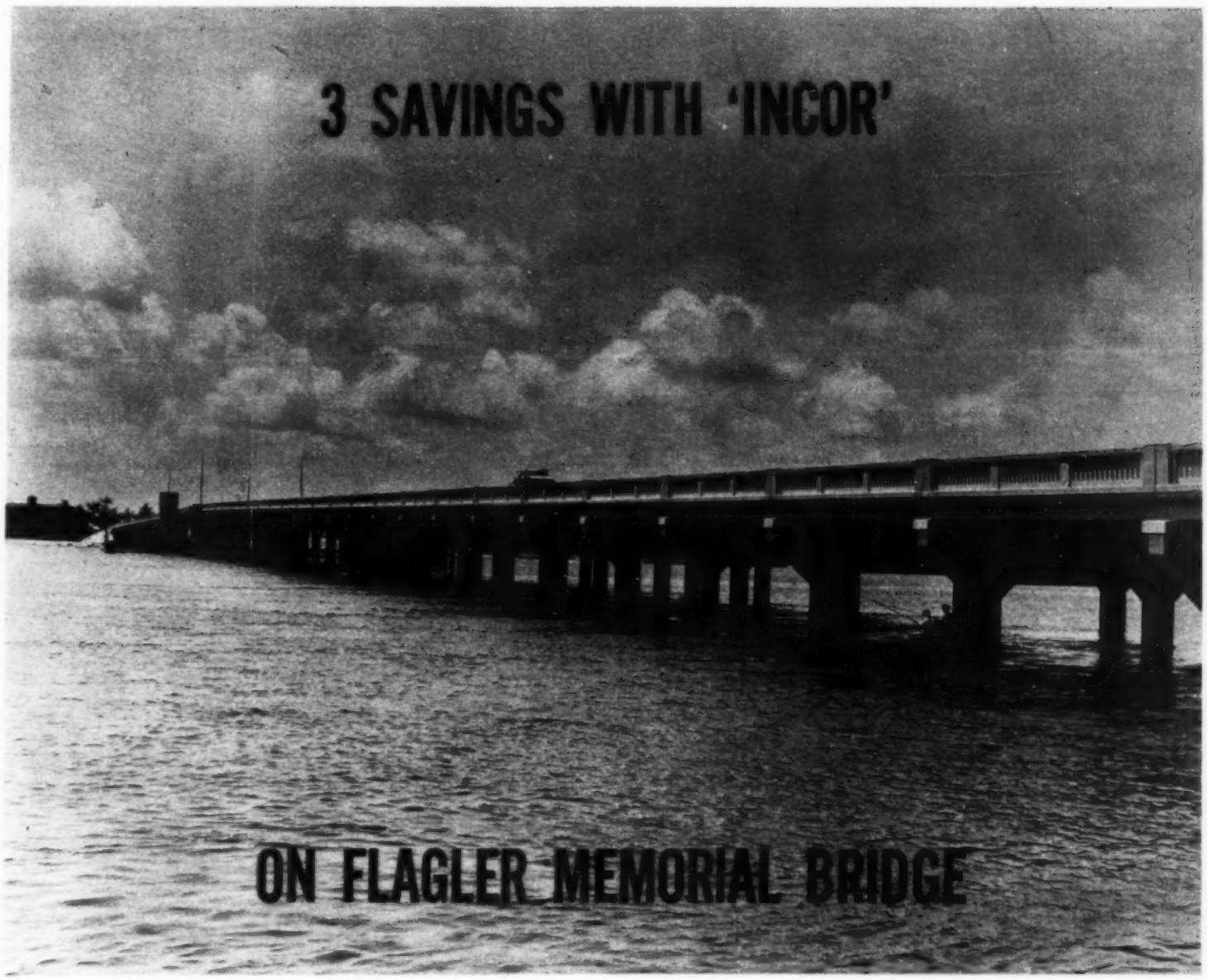
"Don't let me forget my dentist appointment this afternoon."



"Psst! My husband wants to be covered with sand!"



IT IS a matter of simple job analysis to find the low-cost erection schedule. Fact is, on almost every job, at one point or another, 'Incor' shows a clear-cut net saving.

On the new Flagler Memorial Bridge, West Palm Beach, Fla., for example, E. H. Latham Co., contractors, of that city, saved 25 days in completing pile casting and driving, plus 25 days more on the roof of the control house, and 13 days on Bascule leaves — which were poured one day, lifted the next.

In spite of delays elsewhere, 'Incor' made it possible to open the bridge right on the day specified, avoiding a $25-a-day penalty. Earlier completion also meant reduced overhead — $40 to $75 for every day saved on jobs of this size. *'Incor' produces dense, durable, watertight concrete of high sea-water resistance, as proved by 12 years' service under similar exposure conditions.*

Use 'Incor'* wherever dependable 24-hour service strength and fast, thorough job curing save money. Elsewhere, use Lone Star — the standard of Portland cement quality for over a quarter century. Write for copy of "Cutting Concrete Costs." Lone Star Cement Corporation, Room 2261, 342 Madison Avenue, New York.

*Reg. U. S. Pat. Off.

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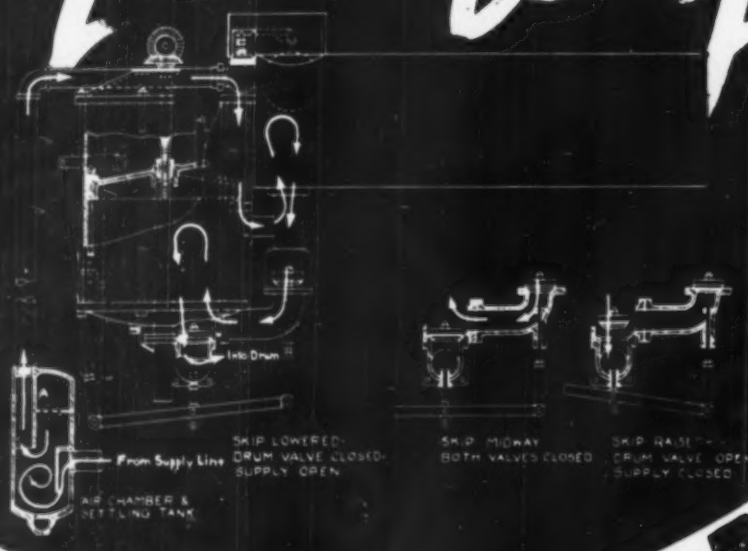
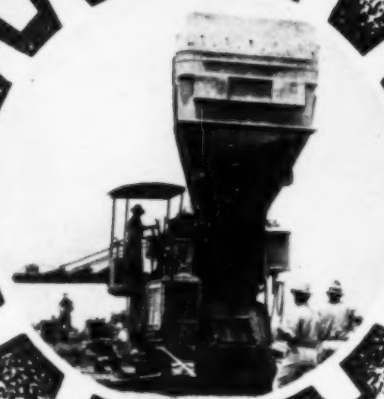
Geared to the Job!



27E



with Plenty of Water Accurately Measured

COUNT these MultiFoote No Pressure Water Tank advantages in terms of what they will save *you* in time and trouble:—

- Accurate water measurement to a fraction of a pound or gallon, regardless of line pressures or grades!
- Extra capacity auxiliary tank for water line changes without shutdown!
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- Two water gauges for convenient checking—one near operator's platform, one readily visible to inspector!
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And the No Pressure Water Tank is only one of the many MultiFoote features that mean better, faster paving at lower cost. From crawlers to skip hoist the MultiFoote 27E is geared to today's paving jobs—Don't fail to get details on the MultiFoote before you buy a paver!

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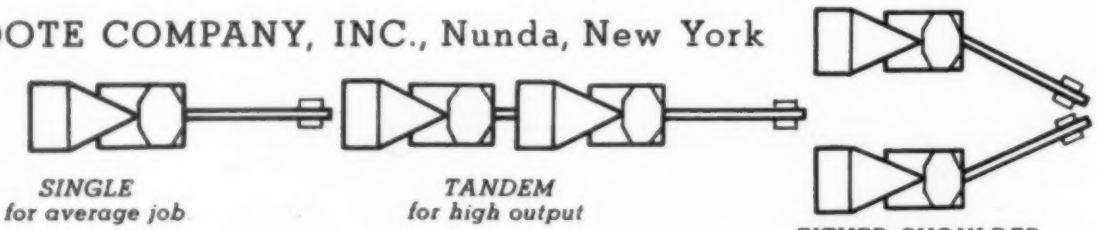

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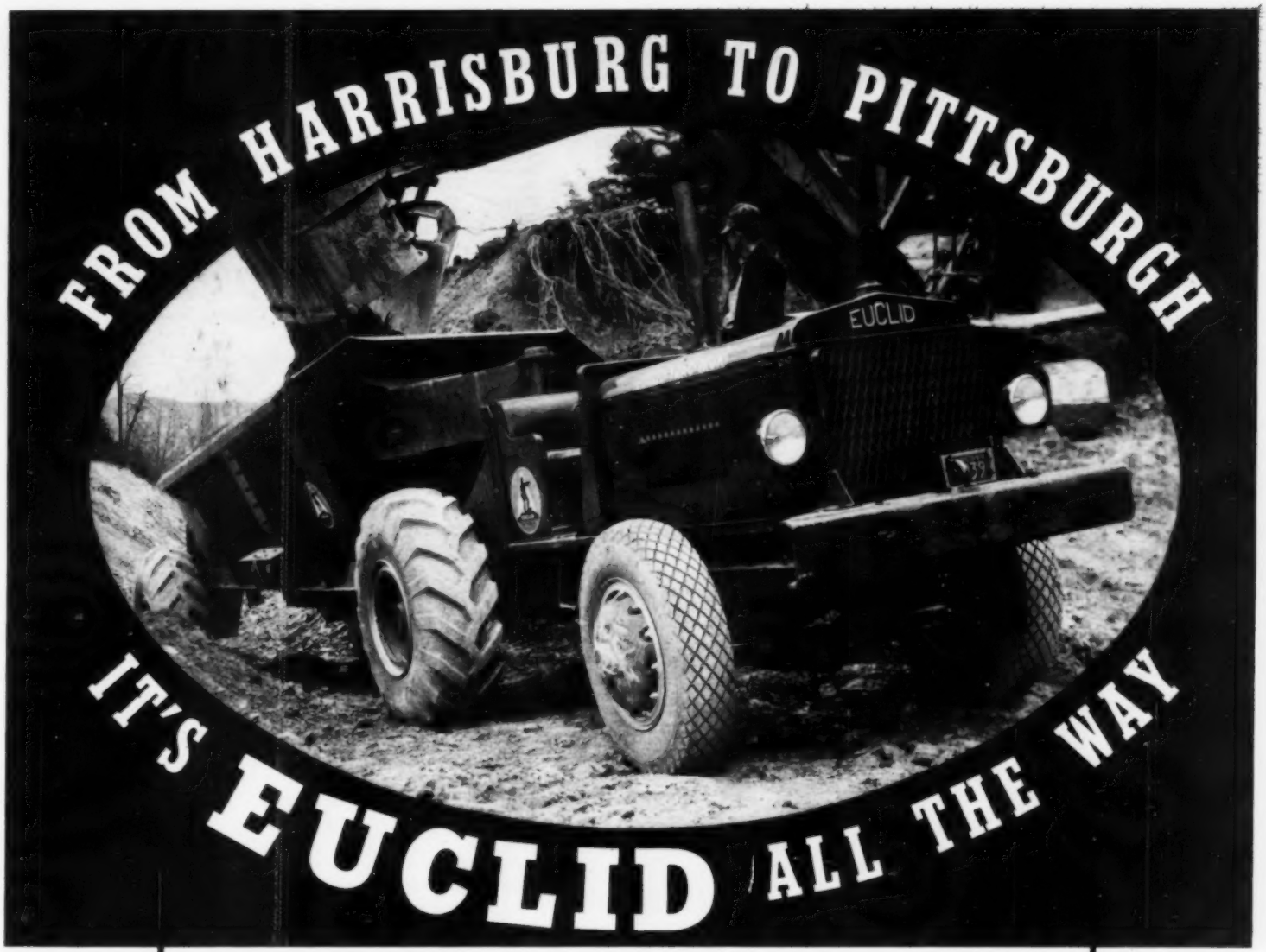

AGAIN Euclids are the trail blazers! This time on the Pennsylvania Turnpike, the new 160-mile, 4-lane super highway between Harrisburg and Pittsburgh that will cut a 200-foot wide swath through the countryside. Today, spotted on haul roads from one end to the other of this project, you will find Euclids breaking new frontiers for motoring America. Already over 60 Euclids are at work on jobs that call for the handling of millions of yards of earth . . . and as the work progresses and additional contractors receive awards, more and more Euclids will go into service on this project. Here again is a tribute to Euclid's superiority as a hauling unit built to move more dirt faster and at lower cost. If you are looking for this kind of performance, check up on Euclids . . . it's a sure way to insure your profit margin.

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Alfred Kaufmann, President, Link-Belt Company.

Two great manufacturing companies... two outstanding lines of excavating and handling equipment... two highly efficient engineering and service organizations are now joined under one banner. This brings to users of both small and medium size machines the combined service and parts facilities, as well as the engineering and manufacturing resources and experience of these two great organizations.

Above: Link-Belt Speed-o-Matic shovel working on N. Y. State Barge Canal Project. Right: Shovel runner's girl friend, comfortably seated; showing convenience and ease of operation of Link-Belt Speed-o-Matic hydraulic control.

Link-Belt Speed-o-Matic dragline handling sand and gravel from pit to belt conveyor.

THE LINK-BELT LINE

The Link-Belt line of heavy-duty crawler-mounted shovels-draglines-cranes, comprises machines of 1¼ cu. yd. to 2½ cu. yd. capacity.

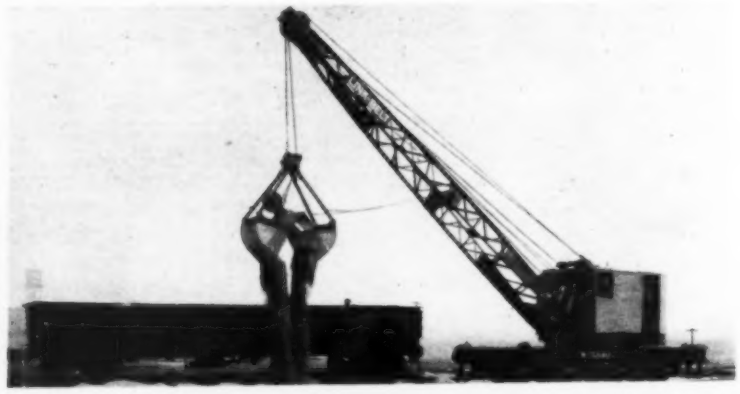
These machines, designed for gasoline engine, Diesel engine, oil engine, or electric motor drive, are equipped with Link-Belt Speed-o-Matic hydraulic-pressure control, with short, fast, easy-throw levers.

Speed-o-Matic control eliminates operator fatigue and tremendously speeds-up operation, resulting in greatly increased output as compared with machines of corresponding size having mechanical levers.

Like the Speeder line, each of these Link-Belt machines is an easily convertible, all-purpose unit, serving as a shovel, a crane, a dragline, a trench hoe, etc. This ease of convertibility is a valuable feature, as it reduces the owner's investment in equipment to a minimum, without limiting the range of work possible.

The Link-Belt line also includes a full range of sizes of locomotive cranes, which are most commonly used in 8-wheel standard-gauge track-type, but can also be furnished in 4-wheel and wide-gauge types. Link-Belt also builds stationary cranes, gantry cranes and pier cranes, to meet special conditions, as well as long-radius cranes, with wide-gauge single or double track trucks, to meet conditions beyond those for which the standard-gauge cranes are designed.

Link-Belt Company has been building locomotive cranes for the last 40 years, and was first to build a locomotive crane especially designed for internal combustion engine drive. Until the company developed its "L" type machine, locomotive cranes had been designed only for operation with either steam engine or an electric motor.



Link-Belt "L" type gasoline-engine-operated locomotive crane unloading sand and gravel with clam shell bucket.

LINK-BELT COMPANY

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Speed-o-Matic

SHOVEL-DRAGLINE-CRANE—1¼ to 2½ YD. CAPACITY

SPEEDER

GREATER SERVICE

The "Speeder" line of ¼ to 1 yd. power operated shovels-draglines-cranes is now added to Link-Belt's Speed-o-Matic line of 1¼ to 2½ yd. machines. The Shovel Division of Link-Belt Company consolidated with the Speeder Machinery Corp., will be under the direct management of Mr. T. M. Deal, and will be operated as a separate and distinct unit of our business.

Troy M. Deal, President.

THE SPEEDER LINE

The speeder line of light-weight convertible shovels, sold and serviced by reputable dealers in all parts of the world, includes the following:

Crawler-mounted machines of ⅜ to 1-cu. yd. capacity.

Truck-mounted machines of ⅜ to ¾ cu. yd. capacity.

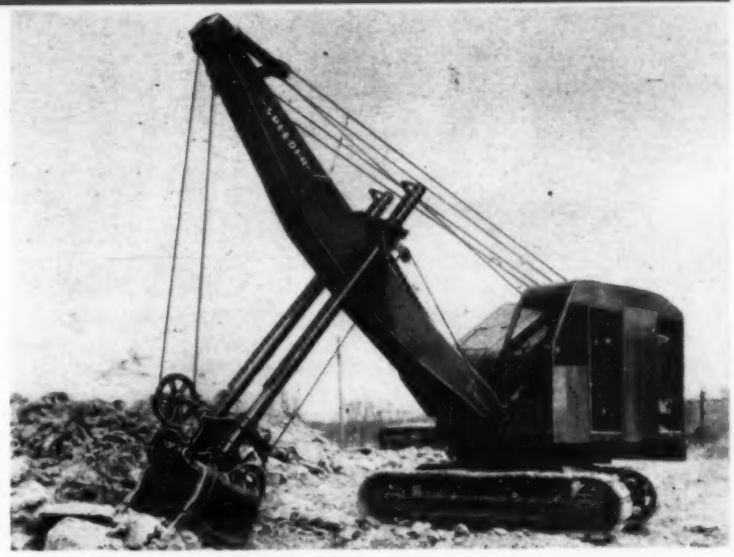
"Caterpillar" Tractor-mounted machines of ⅜ cu. yd. capacity.

Each of these machines is a fully convertible unit. It may be fitted as a shovel; trench hoe or pull shovel; dragline; crane with hook block or clam shell; pile driver; or skimmer scoop—without requiring any mechanical changes, aside from substitution of cables and drum lagging.

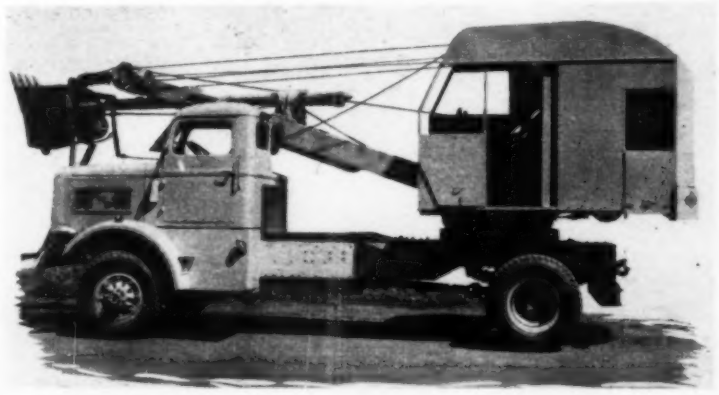
Crawler mounted shovels are extensively used in road-building, and various kinds of excavation, including basement work. With dragline attachments and wide crawlers they are ideal machines for ditch cleaning, sand and gravel excavation and small lake dredging. State, County and Highway Departments, Drainage Districts and other Governmental Departments, find many varied uses for these small, convertible excavators.

Truck-mounted cranes and shovels are very mobile units for small scattered jobs of steel erection, material handling and excavation.

Also included in the line are Speeder Trailers, of platform or skeleton type, with 4 or 6 wheels, pneumatic-tired, for moving Speeder shovels and other machines quickly and economically from one job to another.



Speeder crawler-mounted shovel operating in a Missouri rock quarry.



A Speeder truck-mounted shovel, full revolving, fully convertible.

A "Caterpillar Tractor" mounted Speeder convertible shovel—a machine with unequaled utility, since it combines a Caterpillar tractor and Speeder convertible shovel in one unit while retaining all the advantages of both the tractor and the shovel. The machine operates equally well with dragline, crane, pile driver, clam shell or other commonly used attachment.

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COVERING the State of Oklahoma and with a reputation for "going through" regardless of weather, Mistletoe Express Service took the time to make the following test.

Selecting one of their Internationals, Model D-50, they flushed the crankcase and began the use of Insulated Havoline Motor Oil.

Checking up on results at the end of 40,000 grueling miles, Maintenance Supt. Ward's conviction was justified . . .

There was absolutely no sludge in the crankcase.

All bearings were in perfect condition.
The entire engine was very clean.

Trained automotive engineers are available to help you to better lubrication results at less cost. To get this engineering service, or for prompt delivery, phone the nearest of our 2229 warehouses or write:
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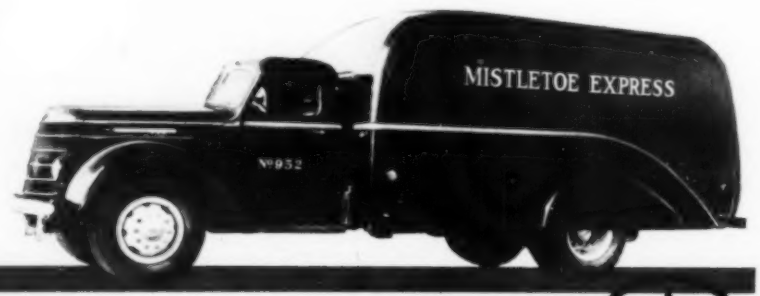

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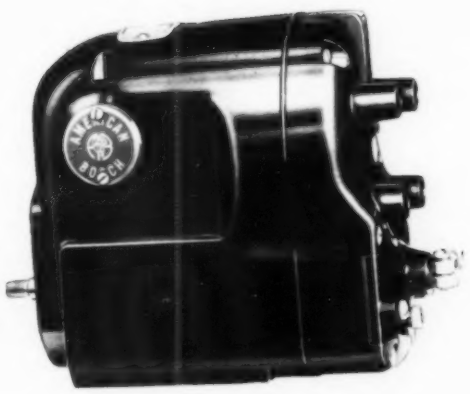


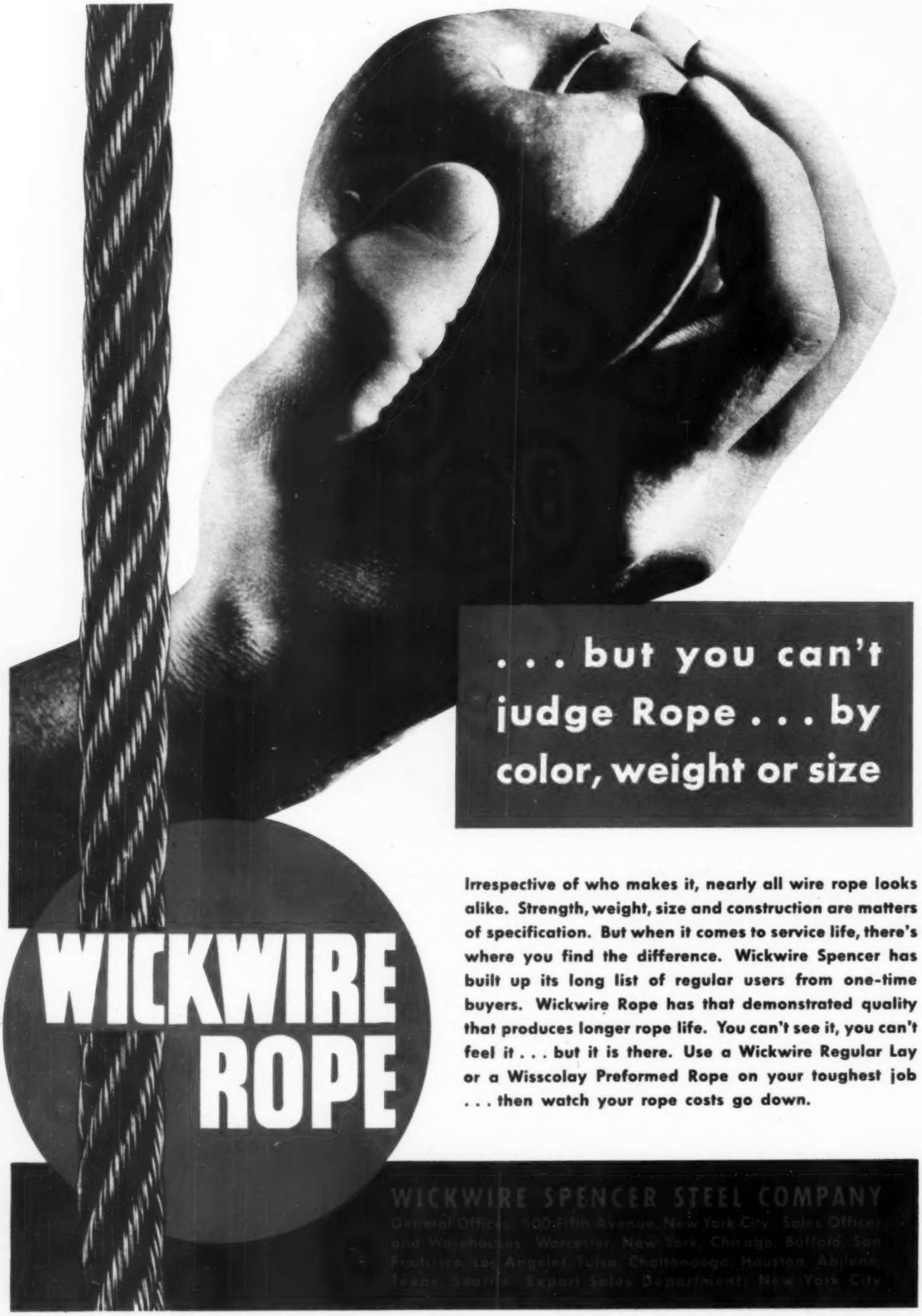
OVER 50 foremost manufacturers of automotive, stationary and marine engines and machinery point with pride to the use of American Bosch Magnetos on their equipment. They know it has remained for years the mark of leadership in magneto ignition.

Now—with the American Bosch Super Powered Magneto—it means more than ever before. This newest magneto has an amazing magnet metal that has 6 times more magnetic power. As employed by American Bosch it revolutionizes magneto design ... creates new standards of dependability ... often cuts magneto maintenance costs in half. New booklet tells the story—write for it.

AMERICAN BOSCH CORPORATION, Springfield, Mass.

AMERICAN BOSCH

Super Powered MAGNETO



. . . but you can't judge Rope . . . by color, weight or size

WICKWIRE ROPE

Irrespective of who makes it, nearly all wire rope looks alike. Strength, weight, size and construction are matters of specification. But when it comes to service life, there's where you find the difference. Wickwire Spencer has built up its long list of regular users from one-time buyers. Wickwire Rope has that demonstrated quality that produces longer rope life. You can't see it, you can't feel it . . . but it is there. Use a Wickwire Regular Lay or a Wisscolay Preformed Rope on your toughest job . . . then watch your rope costs go down.

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City. Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City.

No NORTHWEST WELDED SHOVEL BOOM has ever failed!
If it's a real Rock Shovel you won't have to worry about output in dirt
WHITE RIVER LUMBER CO. No 4
GASOLINE • ELECTRIC • DIESEL • OIL
Built in a range of 18 SIZES ⅜ yd. capacity and Larger

NORTHWEST ENGINEERING COMPANY

1728 Steger Building • 28 East Jackson Boulevard • Chicago, Illinois

DIRT MOVED AT HALF-PRICE

...at a profit

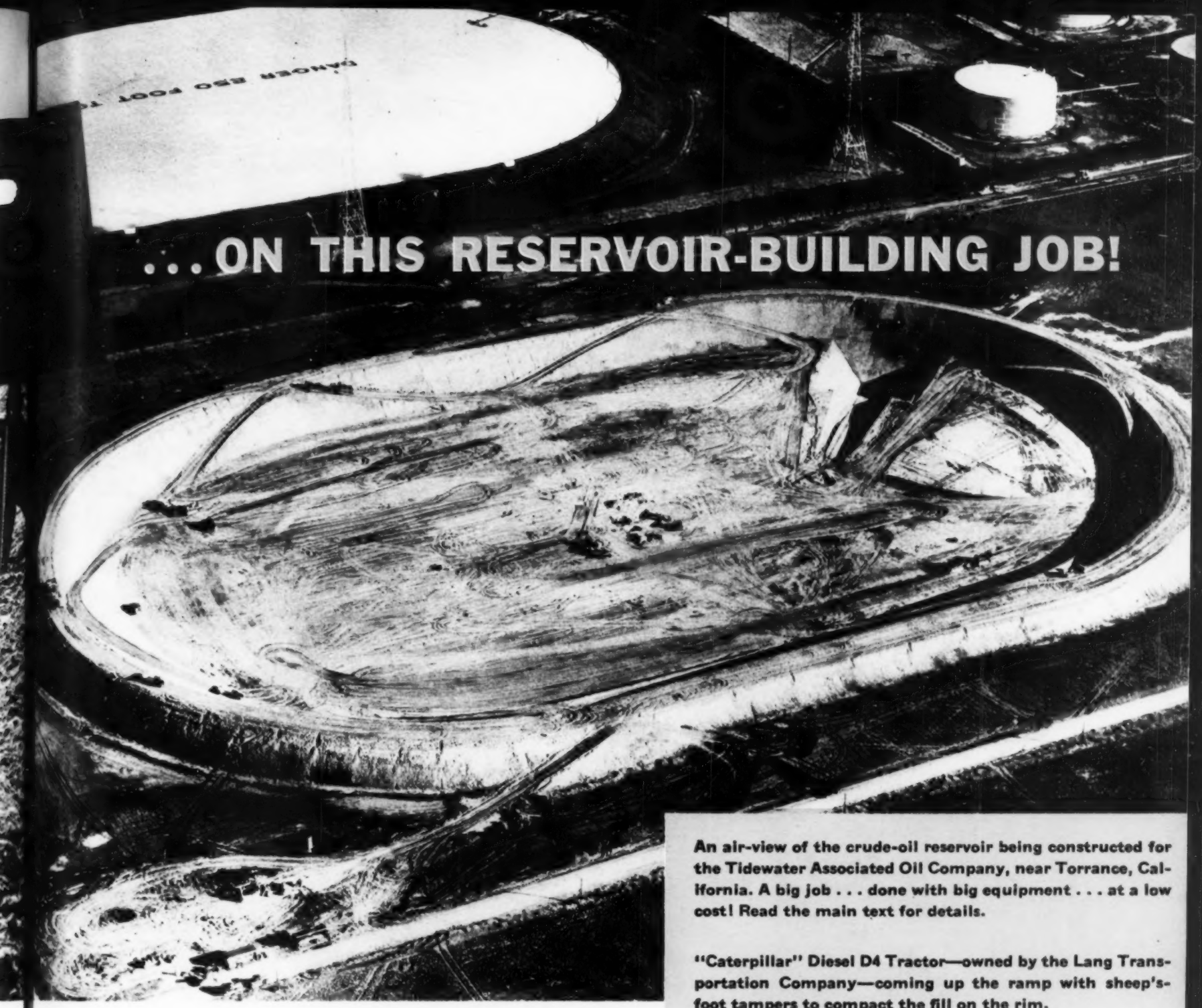
Two payloads coming up the ramp to be dumped on the fill. This is some of the "Caterpillar" Diesel equipment that enabled the Lang Transportation Company to move this dirt at half the cost of other methods!

Inside the reservoir. A "Caterpillar" Diesel D8 Tractor with Le Tourneau scraper gathers material for building the rim. Another tractor pushes from behind to speed-up the load and increase the scraper's capacity.

IF YOU want to get an idea of the money "Caterpillar" Diesels can *save*, look over this crude-oil reservoir completed around the first of the year!

140,000 yards of dirt had to be moved. The Lang Transportation Company, working on the job, sent in eleven "Caterpillar" Diesel Tractors for angledozing . . . hauling carryall scrapers . . . and pulling rooters and tampers. When the work was near its end, Mr. Charles Lang said: "The 'Caterpillar' Diesels have given us a minimum of delays. *The cost per yard moved, compared to any other method, is about half.*"

When you go into a job with "Caterpillar" Diesels—whether it's as big as this or smaller—



An air-view of the crude-oil reservoir being constructed for the Tidewater Associated Oil Company, near Torrance, California. A big job . . . done with big equipment . . . at a low cost! Read the main text for details.

"Caterpillar" Diesel D4 Tractor—owned by the Lang Transportation Company—coming up the ramp with sheep's-foot tampers to compact the fill on the rim.

you can look to come out on top! Fuel-economy . . . freedom from excessive repairs, saving not only costs but time-losses . . . and a capacity for big loads and heavy work all add up to a better balance on *your* side of the ledger!

See your "Caterpillar" dealer, and let him fit your next job with the equipment it needs to make money!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR DIESEL POWER

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY

AFTER THOUSANDS OF HOURS IN HOTTER THAN DESERT HEAT

New "RPM" DELO

[Diesel Engine Lubricating Oil]

Order from Your Nearest Distributor as Listed Below:

IN THE UNITED STATES

"RPM" Diesel Engine Lubricating Oil:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol "RPM" Diesel Engine Lubricating Oil:
The Carter Oil Company (Tulsa, Oklahoma)
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso "RPM" Diesel Engine Lubricating Oil:
Standard Oil Company (Inc. in Kentucky)

Signal "RPM" Diesel Engine Lubricating Oil:
Signal Oil Company

Sohio "RPM" Diesel Engine Lubricating Oil:
The Standard Oil Company (Ohio)

IN CANADA

"RPM" Diesel Engine Lubricating Oil:
Imperial Oil Company Limited
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries. Get in touch with your nearest distributor.

Keeps rings free — filters clean — and bearings free from corrosion

MILLIONS OF MILES, and thousands of hours of tests have proved NEW "RPM" DELO is the UNEQUALED lubricating oil for every type of Diesel engine, under every operating condition, in any kind of weather. For example—

Take the HOT-BOX TEST—one of the most severe performance tests ever devised. We operated typical Diesel engines under full load enclosed in boxes where the radiators were fed with air at 125° F. This drove the sump-oil temperature to scorching heat—which was maintained 24 hours a day, every day for over a month! RESULT: All rings free, oil ring slots open, carbon and sludge negligible. Engine in perfect condition!

And when it's cold, NEW "RPM" DELO continues to do its same unequaled job. Extended tests with a water-jacket temperature held down to 80° F., and with water actually added to the crankcase at 20-hour intervals, also resulted in clean-engine, ring-free operation. No clogged filters or stoppage of oil flow, either.

Ask our Representative or your nearest Distributor to show you the complete Engineers' Report on NEW "RPM" DELO with pictures and charts, proving the superior performance of this oil. Still better—prove its cost-cutting advantages for yourself in your own Diesel engines.

NEW "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

RPM
DIESEL ENGINE LUBRICATING OIL

STANDARD OIL COMPANY OF CALIFORNIA

It's Tops Any Way You Test It

Mitchell Bros. Construction Co. Rolls Up Yardage in Rock and Dirt with Chain Crowd

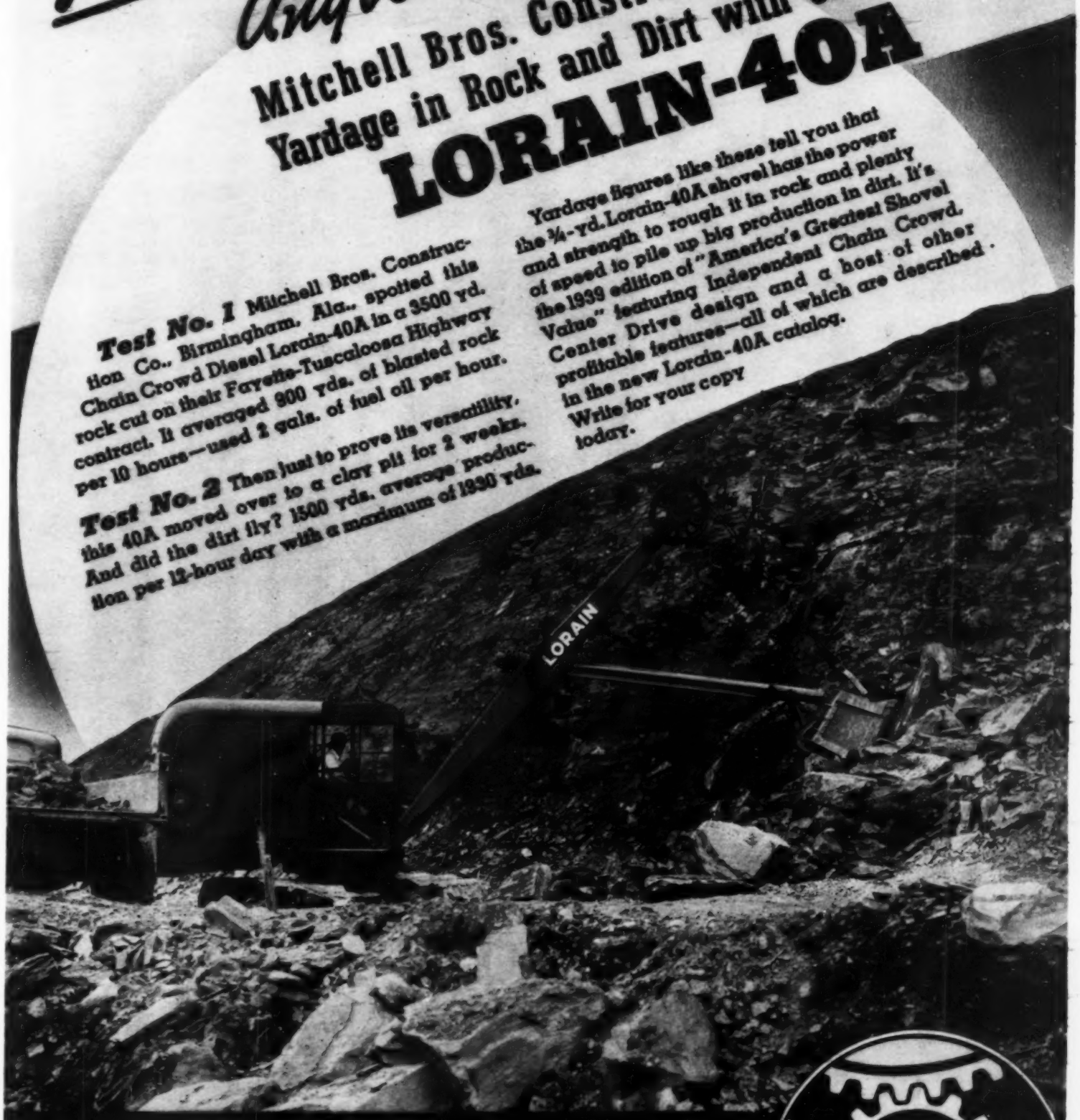
LORAIN-40A

Test No. 1 Mitchell Bros. Construction Co., Birmingham, Ala., spotted this Chain Crowd Diesel Lorain-40A in a 3500 yd. rock cut on their Fayette-Tuscaloosa Highway contract. It averaged 900 yds. of blasted rock per 10 hours—used 2 gals. of fuel oil per hour.

Test No. 2 Then just to prove its versatility, this 40A moved over to a clay pit for 2 weeks. And did the dirt fly? 1500 yds. average production per 12-hour day with a maximum of 1930 yds.

Yardage figures like these tell you that the ¾-yd. Lorain-40A shovel has the power and strength to rough it in rock and plenty of speed to pile up big production in dirt. It's the 1939 edition of "America's Greatest Shovel Value" featuring Independent Chain Crowd, Center Drive design and a host of other profitable features—all of which are described in the new Lorain-40A catalog.

Write for your copy today.



3/4 YD. LORAIN-40A

UNIVERSAL CRANE DIVISION • THEW SHOVEL COMPANY
LORAIN, OHIO

THEW CENTER DRIVE
REG U.S. PAT. OFF.

HARRISON CONSTRUCTION ON THE PITTSBURGH HOUS IN

Bought t

192 PAY YARDS an hour per Scraper

Harrison Construction Company was already equipped with six 12-Yard Carryall Scrapers before they were awarded the first, 1,500,000-yard section of the Pittsbugh Housing Project levelling contract. But preliminary tests proved to them they could come out with a *greater net profit* and be sure of getting the job by adding two new LeTourneau "RU" Carryalls . . . rated at 30-yards heaped measure.

Production bears this out! On 1,750-foot round trip hauls, each "RU" is averaging *24 pay yards* every 7:20 minutes . . . *192 pay yards* per hour of rocky clay, shale and sandstone! Loading down 6% to 8% slopes these Carryalls are pusher loaded with a "Caterpillar" low gear D8 in from 70 to 100 seconds in but 100′ to 150′.

Later, when ledge rock is bared, Harrison's LeTourneau Heavy Duty Rooter will help maintain this kind of production by giving perfect fragmentation for Carryall operation at a fraction of blasting costs.

You just *can't* realize how great savings with the LeTourneau method can be 'till you've had a demonstration . . . on *your* job. Ask your LeTourneau and "Caterpillar" dealer for one . . . today! R. G. LeTOURNEAU, INC., Peoria, Illinois; Stockton, California. Cable address: "Bobletorno".

ING PROJECT AND C. J. LANGFELTER ON THE TURNPIKE

to Underbid all COMERS and still make a PROFIT

Contracts are still being awarded on low bids! Contractors are *still* staying in business only as long as they can show profits. Equipment is still being *bought* and keeping contractors in business only as long as it will handle *all* jobs that come their way at *less cost-per-yard* than any other method can produce.

C. J. Langfelter & Son are proving on their 6.9 mile Pennsylvania Turnpike contract that the LeTourneau method of Rooters, 'Dozers and Carryall Scrapers can't be matched in shale and rock . . .

But maybe you've already noticed that whenever the job presents *real problems,* LeTourneau Rooters "blast" their way through the toughest digging for the lowest cost removal and placement ever offered . . . with LeTourneau 'Dozers and Carryall Scrapers!

THE *Only* way you can bid LeTourneau prices is to *use*...

LETOURNEAU

ROOTERS* 'DOZERS CARRYALLS*

"We've worked this Diesel Truck 21 hours a day for 17 months with GULF PARVIS OIL in service"

... SAYS THIS SUPERINTENDENT

"Talk about hard service," says the superintendent on this job. "These trucks really get it—21 hours a day! And with Gulf Parvis Oil we've made a fine record. It has paid us to follow the Gulf engineer's recommendations."

If you want your equipment to make an outstanding operating record like this, ask the Gulf engineer who calls on you to recommend the right lubricants for it — and their proper application. He is familiar with the problems of Diesel lubrication and can help you get high operating efficiency from your equipment. There is no charge for this service.

No matter where your job is located, Gulf products are readily available to you through more than 1100 warehouses in 28 states from Maine to Texas.

GULF OIL CORPORATION
GULF REFINING COMPANY
PITTSBURGH, PENNSYLVANIA

GULF INDUSTRIAL LUBRICATION

ALSO A COMPLETE LINE OF FUEL AND FURNACE OILS

BROKEN CYCLES *Shoot your Profits*

Cummins Diesels reduce the need for figuring "50 minute hours" in your bid. The Cummins Diesel's utter dependability and low ton-mile costs have revised the figures on even the toughest dirt-moving jobs. Ample job-test evidence covering millions of yards of dirt moving is yours for the asking . . . evidence that substitutes facts for guesswork . . . proof for expectancy. Cummins Engine Company, 1716 Wilson Street, Columbus, Indiana.

TOP ILLUSTRATION. Two of four Cummins Diesel-powered Euclid Trac-Truks on the Kingsley Construction Company's 100,000-yard air-port job near Wheeling, West Virginia.

RIGHT. One of the 19 Cummins Diesel powered Euclids in Martin Wunderlich's Cummins Diesel-powered fleet No. 2. Working on the Kingsley Earthfill Dam, Ogallala, Neb., second largest in the world. The truck foreman says, "We wouldn't trade them for anything else."

CUMMINS
Dependable
DIESELS

Larger Loads....Extra Dividends!

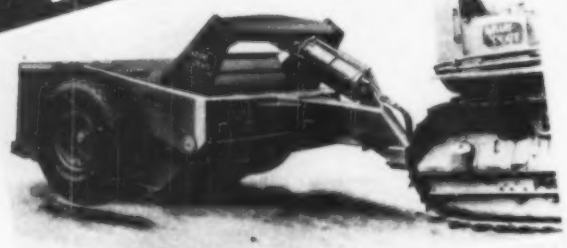
LAPLANT-CHOATE
Hydraulically-Controlled
CARRIMOR
A Really *Modern* Scraper

THERE is no time lost "figgering out" how to solve tough scraping problems when a famous LaPlant-Choate Carrimor Rear Dumping Scraper is on the job. Here is a scientifically designed, hydraulically controlled unit that digs, hauls and dumps *larger loads* with *less power*. Just watch the dirt "boil" into the bell-shaped bowl and you know instantly that the Carrimor is saving you time and money.

The rear dumping feature allows you to back your Carrimor right up to the edge of a fill . . . or you can dump and spread a smooth layer on surface operations. On inclines where an ordinary four-wheel scraper might tip, Carrimor goes right on through. In close quarters, Carrimor gets in and out easily.

Carrimor keeps your "Caterpillar" Track-type tractors in productive use. They are safe and easy to handle . . . highly mobile under any ground conditions. Larger loads . . . lower costs . . . extra profits—you get all 3 with a LaPlant-Choate Carrimor.

Available in 3 sizes. Get full details from your LaPlant-Choate and "Caterpillar" dealer. Write today for Free catalogue.



Showing the Carrimor in hauling and digging positions. Note high clearance to help avoid obstacles. Finger-tip hydraulic control assures positive down pressure for digging.

Rugged strength and simplicity of design give you low maintenance cost.

The Carrimor can be equipped with Athey Tracks for working in very soft places.

TAMPING ROLLERS
SCRAPERS • TRAILBUILDERS

LA PLANT-CHOATE MANUFACTURING CO. Inc.

RUBBER WHEELED WAGONS
BULLDOZERS • SNOW PLOWS

CEDAR RAPIDS, IOWA.

JAEGER *Speed* MIXERS

LATEST MODELS OF THE FASTEST-SELLING LINE OF BUILDING MIXERS IN THE WORLD

These are the models most contractors are buying for their 1939 jobs. They're speedier than ever, lighter, stronger—trail to work faster, start you pouring sooner, produce yardage at a pace that makes jobs move. Features that other mixers don't have (Automatic Skip Shaker, Criss-Cross "Re"-Mix, Pressure Discharge, 25% Bigger Engines, Machined Steel Drum Tracks) mean bigger profits, longer service for Jaeger owners. Mail slip below for new catalog and prices—3½S to 56S sizes.

10S SPEEDLINE ON 2-WHEELS

"SPEEDLINE" END DISCHARGE 7S, 10S, 14S MIXERS

The leading building mixers today—amazingly fast and easy handling, hundreds of pounds lighter, yet stronger. Interchangeable 2 or 4-wheel mountings.

DEMAND MACHINED STEEL DRUM TRACKS ON YOUR MIXER!

MONARCH CONSTRUCTION CO. PHILADELPHIA

91" WIDE SKIP

14S SPEEDLINE WITH WIDE SKIP, 4-WHEELS

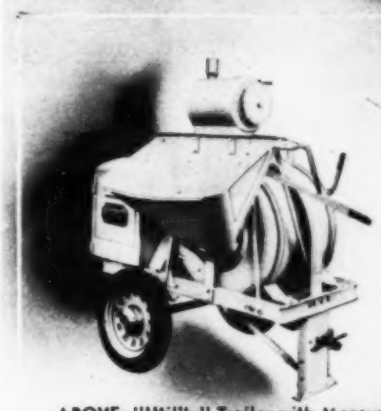
A COMPLETE LINE OF MIXERS TO MEET YOUR JOBS!

Non Tilts, 3½S to 56S—End or side discharge portable type — Compact one- and two-yard plant mixers.

Tilters, 3½S to 7S with Patented "V" Spot Dual-Mix Drums.

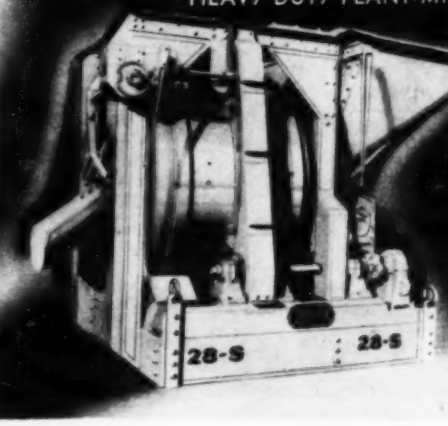
Plaster-Mortar Mixers, 6 Ft. and 10 Ft. Sizes.

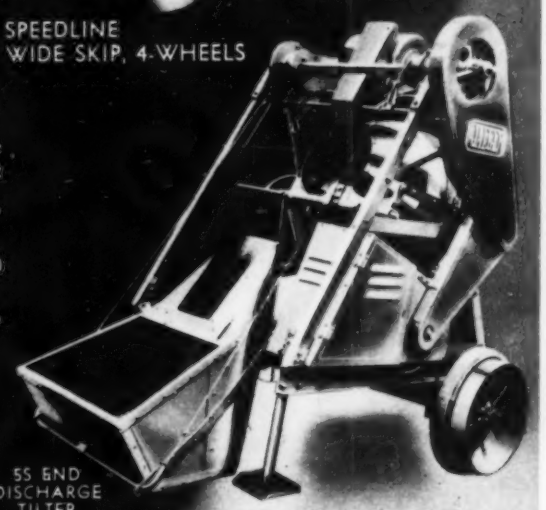
Portable Bituminous Cold Mix Plants, 6, 10 and 14 Cu. Ft. Sizes.



ABOVE: "Utility" Trailer with Measuring Hopper—fast as a costly power loader—up to 40 cu. yds. a day. BELOW: "Speedster" 3½S Tilter with same dependable air-cooled engine used on Jaeger Pumps.

HEAVY DUTY PLANT MIXERS





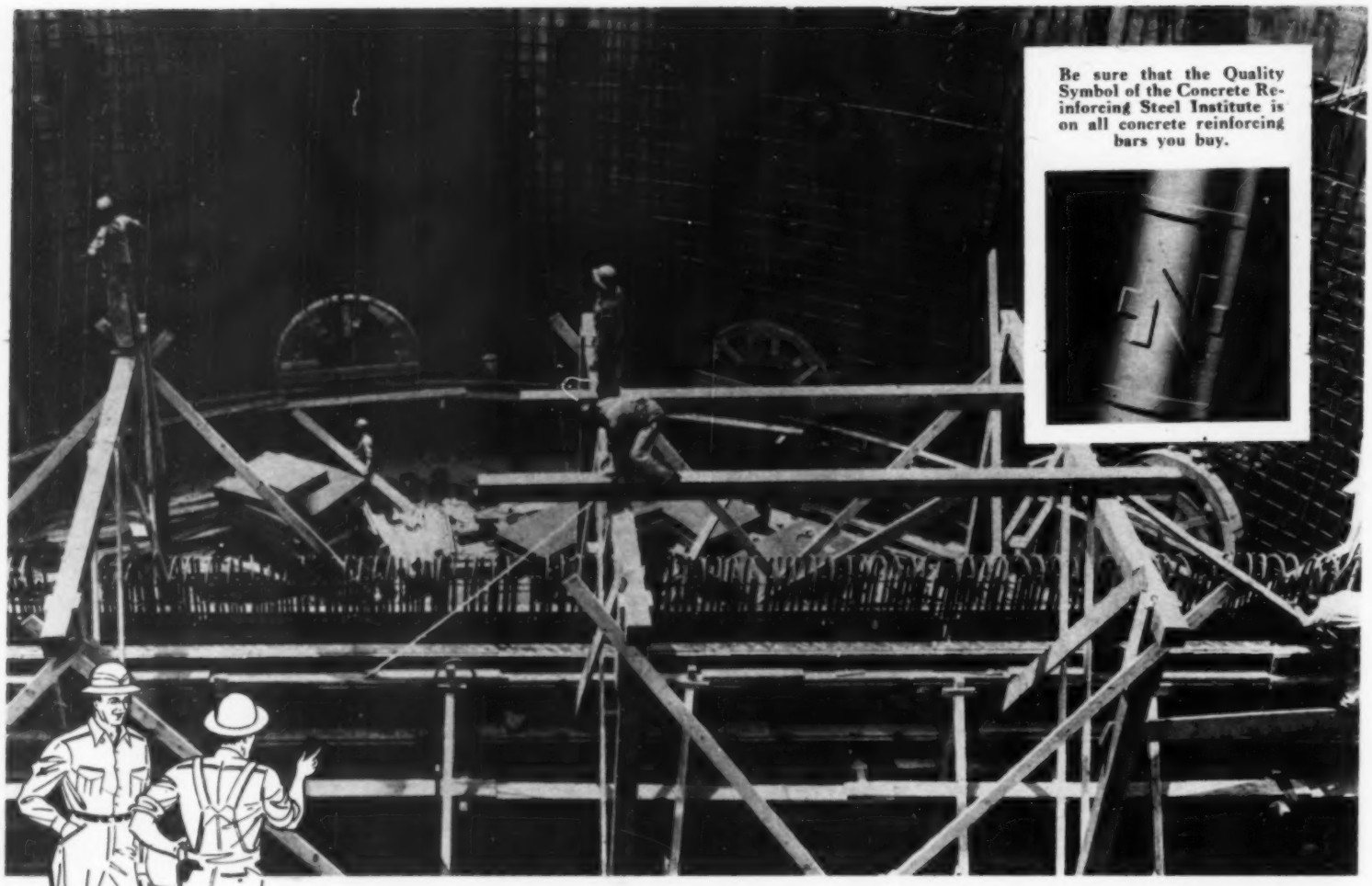
55 END DISCHARGE TILTER

THE JAEGER MACHINE COMPANY
800 Dublin Avenue, Columbus, Ohio

Send new Catalog, prices on ☐ Non Tilts ☐ Tilters ☐ Plaster-Mortar Mixers ☐ Bituminous Mixers.

Name_____

Address_____



Be sure that the Quality Symbol of the Concrete Reinforcing Steel Institute is on all concrete reinforcing bars you buy.

"THIS JOB'S MOVING RIGHT ALONG —WE GOT PLENTY OF BARS ON TIME"

LOOKS like this won't be one of those jobs where we stall around waiting for materials. We're off to a good start. And that's important because the boss says things have got to move right along—there's a tough penalty clause in his contract."

Penalty clause or not, it pays to get concrete reinforcing bars from a source of supply that can deliver on time if you want to get full working time out of men and equipment. That's why U·S·S Concrete Reinforcing Bars are specified for so many jobs. Our distributors are so located and so equipped that they can deliver bars to you where you want them and when you want them. Should you not have facilities for bending and cutting, they can be done to your specifications before the bars are delivered to the job.

You get two guarantees of quality when you specify U·S·S Concrete Reinforcing Bars—the U·S·S name and the Quality Symbol of the Concrete Reinforcing Steel Institute. U·S·S Products are famous for the uniformity of their high quality and the precision of their manufacture. All U·S·S Bars carry the Symbol of the Concrete Reinforcing Steel Institute. This means that they are rolled only from *new* billet steel and that they are a product of domestic manufacture.

Order U·S·S Concrete Reinforcing bars for your next job. You'll get this double assurance of quality — and you'll get them on time.

CONCRETE REINFORCING BARS

Manufactured by

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*

TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Look for this symbol on steel products. It represents the finest metallurgical service.

Columbia Steel Co., San Francisco, *Pacific Coast Distributors* · United States Steel Products Co., New York, *Export Distributors*

UNITED STATES STEEL

NEW

the modern 2-yard leader shovel-dragline-crane

The Bucyrus-Erie 44-B offers you performance that means new highs in profit on your excavating. From dipper teeth to cats, it's MODERN. All the skill of the biggest, most experienced engineering staff in the industry; all the resources of the largest excavating machinery manufacturer in the world, have been concentrated on giving you the best possible earning tool. If you're interested in a 2-yard shovel-dragline-crane, write for the new 44-B Bulletin and find out why it's far and away the top machine in its class.

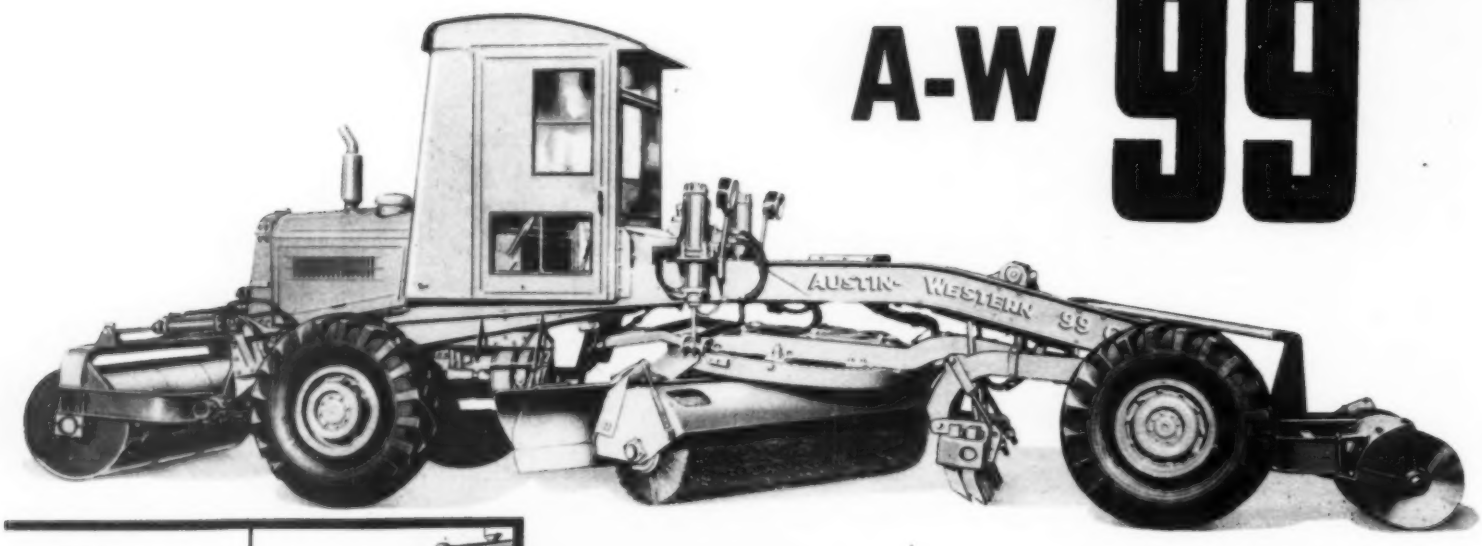
44-B

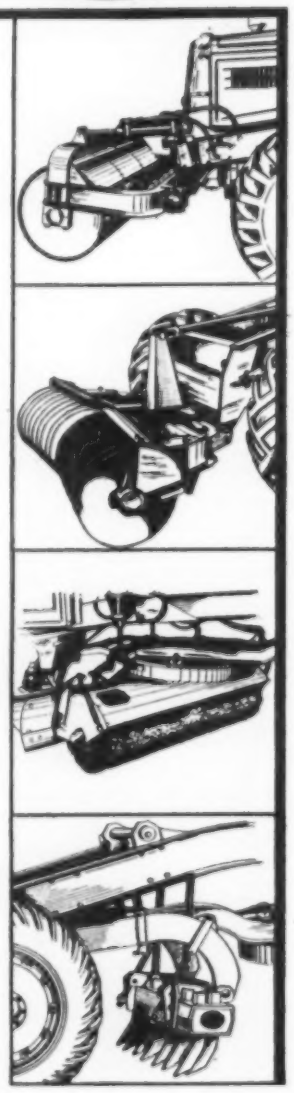
Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

NEVER AN IDLE MOMENT

FOR THE AMAZINGLY VERSATILE A-W "99"





REAR ROLLER . . . Provides a range of compression up to 215 lbs. per lineal inch. Is built in three removable sections; measures 6 ft. long x 30 inches in diameter; operates hydraulically.

DISC HARROW . . . Cutting width about 6 feet. Uses 20 inch heat-treated steel discs. Operates hydraulically. Discs can be angled to suit work. Extremely rugged. A real time saver on difficult discing jobs.

POWER DRIVEN ROTARY BROOM . . . Steel wire. Measures 8 feet long x 26 inches in diameter. Broom pressure on pavements, direction of sweeping, etc., controlled hydraulically from cab.

SCARIFIER . . . Available with staggered tines or tines arranged in V-formation. Hydraulically controlled. When scarifier is raised, hinged block causes tines to fold up, affording extra clearance.

● A "99" Motor Grader never has to be supported in idleness for long periods. It does everything you could possibly ask of a super-powered motor grader; and, in addition, it can be used as a scarifier, roller, broom, harrow, bulldozer, backsloper, snowplow and for pulling other types of equipment.

These PLUS uses . . . eliminating the necessity of investing in a battery of costly auxiliary outfits . . . are made possible by the "99's" extra power, maneuverability, and simplicity of operation. Driving on all four wheels, a "99" can always apply power exactly where you need it for a wide variety of jobs. Front and rear steer enables the operator to put his wheels where he can get the best traction . . . an operating advantage no other motor grader can supply.

No wonder so many "99" owners say this versatile machine would be a "smart" buy at much more than its actual cost. The Austin-Western Road Machinery Co., Aurora, Illinois.

AUSTIN-WESTERN

Motor Graders
Roll-A-Planes
Rollers
Snow Plows

Crushing and Screening Plants
Washing Plants
Blade Graders

Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders

5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor Scraper
12-Yard Hydraulic Scraper

You get some of these advantages in most any shovel, crane or drag-line—*only BAY CITY has them ALL.*

No matter what shovel, crane, drag or hoe you buy, it will dig dirt and handle loads. But some machines are more efficient than others—will turn out bigger performance at lower cost—will stand up longer under gruelling service—will give you a bigger return on your investment because they are designed and built better. For more than 25 years BAY CITY engineers have been studying your problems and have developed many refinements and outstanding advantages to meet your requirements for higher speeds, greater power, easier operation and lower cost. BAY CITY Shovels, fully convertible without machinery change, are made in capacities ranging from ⅜ to 1-¼ yards with safe crane loads up to 20 tons. May we send you a copy of Catalog H-2 which tells the complete story?

BAY CITY SHOVELS, Inc., BAY CITY, MICH.

Export Office: H. M. HEIN, 330 W. 42nd St., New York (Oparo)

Whether you plan to buy a new machine now or later, we suggest that you check the list at the right—let this be your check sheet covering various requirements you want in your next machine. Do this now and

WRITE YOUR SPECIFICATIONS

before you see any shovel representative. If you want detailed literature on BAY CITY, write your name in the margin and send us your check sheet.

BEFORE BUYING YOUR NEXT SHOVEL—

CHECK THIS LIST—THEN CLIP and MAIL FOR COMPLETE DETAILS.

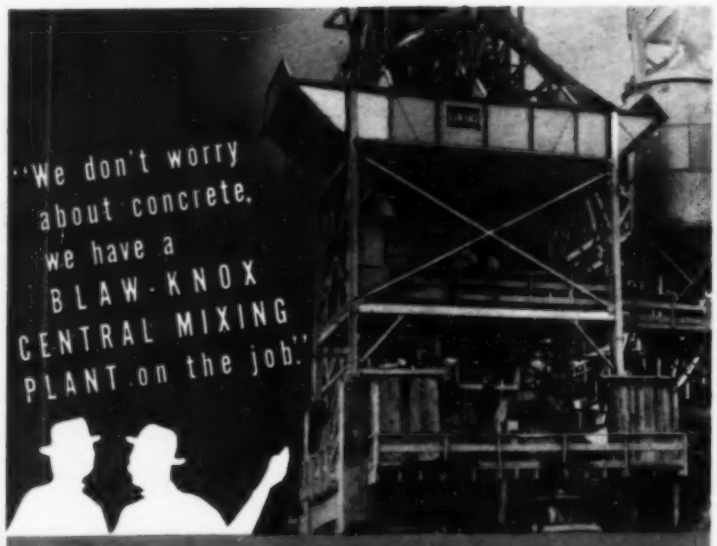
- ☐ One piece chain crowd with automatic adjustment.
- ☐ Helical cut gears for quiet operation and longer wear.
- ☐ Electric Dipper Trip giving instantaneous, positive action.
- ☐ Convenient economical weight.
- ☐ Unit cast alloy steel carbody and revolving table, totally heat treated.
- ☐ Hoist drums in tandem on separate shafts providing shorter distance between bearings.
- ☐ Extra large diameter swing roller path.
- ☐ Anti-friction bearings, even to boom point sheaves.
- ☐ Long crawlers with dual end adjustment and outboard bearings.
- ☐ Oversized clutches and brakes.
- ☐ Drop forged crawler shoes with drilled pin holes and alloy steel pins.
- ☐ Fast operating speeds.
- ☐ Internal swing teeth on bull gear.
- ☐ Extra heavy 10-gauge cab with plenty inside working room.
- ☐ Two travel speeds.
- ☐ Straddle dipper sticks with welded crowd racking.
- ☐ Safety worm boom hoist.
- ☐ Fast, easy steering at full speed without shifting, and with cab in any position.
- ☐ Convertibility to any attachment without machinery change.
- ☐ Positive swing lock (no brakes) in any position of circle.
- ☐ Semi-automatic travel lock.
- ☐ Three lever control—all operations from inside cab.
- ☐ Accessibility for inspection or adjustment.
- ☐ "E-Z" control booster operated clutches.
- ☐ High Pressure lubrication throughout.
- ☐ SEND COMPLETE DETAILS DESCRIBING .....YARD MACHINE EQUIPPED AS .....

BAY CITY SHOVELS

Built for maximum speed and accuracy in measuring AGGREGATES, CEMENT AND WATER, Blaw-Knox Weighing Batchers are standard equipment in widespread use by road contractors, for general construction, material yards, and ready mixed concrete plants. They satisfy all modern specifications. Furnished for manual or automatic operation.

The reliability of Blaw-Knox Weighing Batchers is acknowledged by thousands of users. Send for catalog No. 1566.

BLAW-KNOX
Weighing Batchers

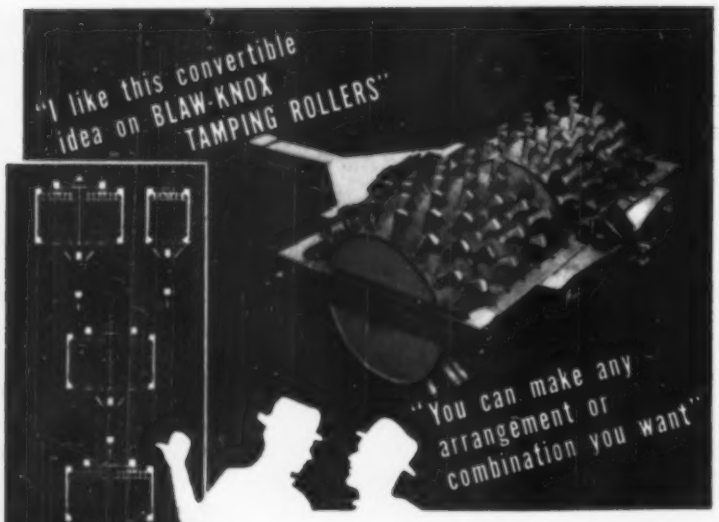


Engineering advice, based on sound experience, is offered as a part of Blaw-Knox service in the design and arrangement of a central mixing plant for your job.

Stationary or floating plants, manual or automatic in operation, have been furnished on hundreds of jobs. Many of them are illustrated in Blaw-Knox Catalog No. 1566.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.
Offices and Representatives in Principal Cities

BLAW-KNOX
Central Mixing Plants



For compacting earth fills—the practical design of Blaw-Knox Sheepsfoot TAMPING ROLLERS appeals to contractors because they give uninterrupted service and meet all modern specification requirements.

The roller units are full floating, on husky frames—built for long, hard use.

Send for complete details and prices.

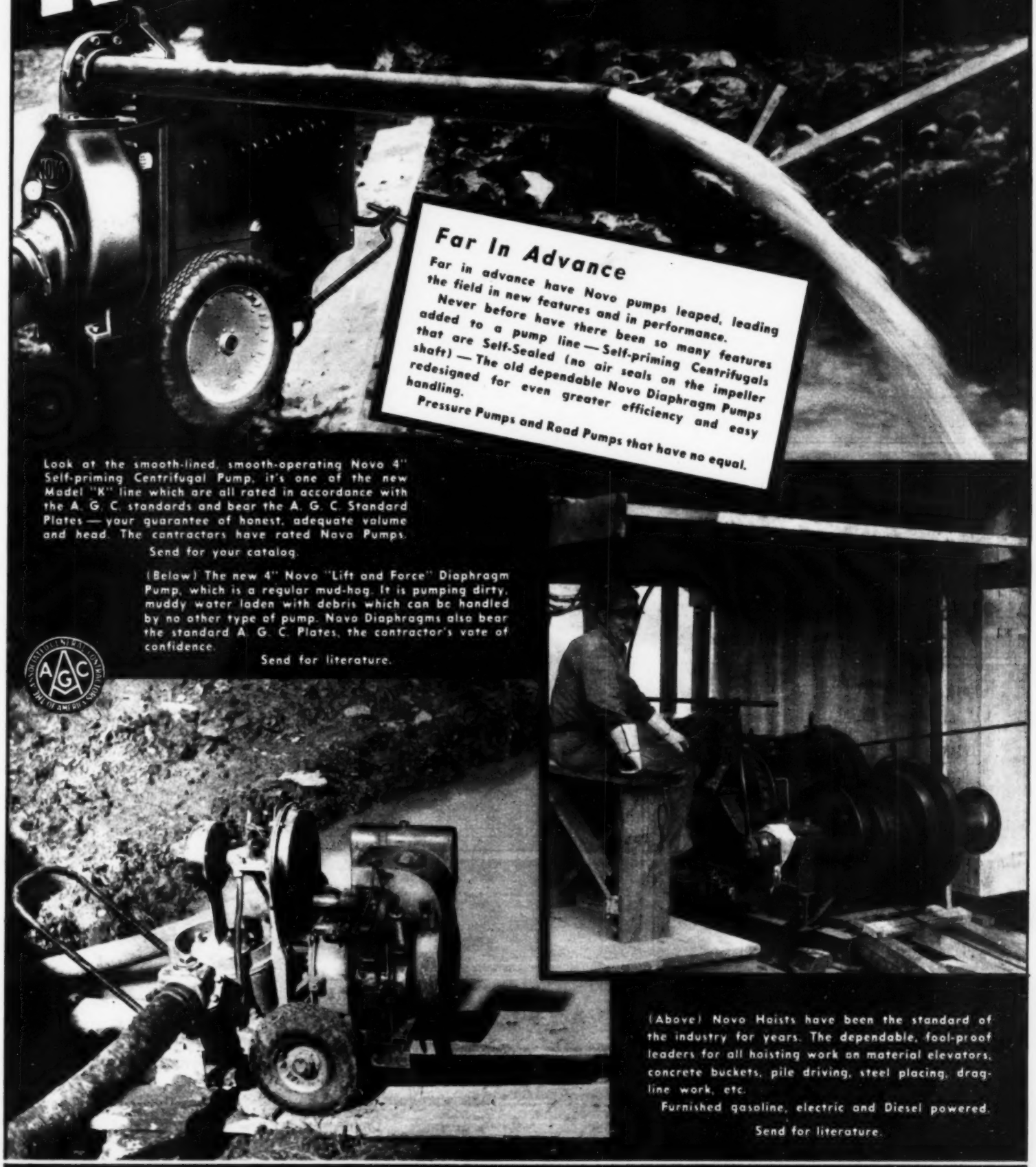
BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PENNA.

BLAW-KNOX
Sheepsfoot
TAMPING ROLLERS

Yes, sealed ball bearing sheaves keep lubrication in and dirt out, to prevent excessive wear and prolong the life of the bucket. In addition Blaw-Knox buckets make generous use of tough alloy steels to avoid excessive dead weight and provide worthwhile savings in rehandling costs. Write Blaw-Knox today for Bulletin 1606.

BLAW-KNOX
Digging and Rehandling
BUCKETS

NOVO Pumps & Hoists



Far In Advance

Far in advance have Novo pumps leaped, leading the field in new features and in performance.

Never before have there been so many features added to a pump line — Self-priming Centrifugals that are Self-Sealed (no air seals on the impeller shaft) — The old dependable Novo Diaphragm Pumps redesigned for even greater efficiency and easy handling.

Pressure Pumps and Road Pumps that have no equal.

Look at the smooth-lined, smooth-operating Novo 4" Self-priming Centrifugal Pump, it's one of the new Model "K" line which are all rated in accordance with the A. G. C. standards and bear the A. G. C. Standard Plates — your guarantee of honest, adequate volume and head. The contractors have rated Novo Pumps.

Send for your catalog.

(Below) The new 4" Novo "Lift and Force" Diaphragm Pump, which is a regular mud-hog. It is pumping dirty, muddy water laden with debris which can be handled by no other type of pump. Novo Diaphragms also bear the standard A. G. C. Plates, the contractor's vote of confidence.

Send for literature.

(Above) Novo Hoists have been the standard of the industry for years. The dependable, fool-proof leaders for all hoisting work on material elevators, concrete buckets, pile driving, steel placing, drag-line work, etc.

Furnished gasoline, electric and Diesel powered.

Send for literature.

SEND THIS COUPON

NOVO ENGINE CO., 214 Porter Street, Lansing, Mich.
I want full information on the:

- Novo Self-priming Cent. Pump —
- Novo Diaphragm Pumps —
- Novo Pressure Pumps —
- Novo Road Pumps —
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LANSING, MICHIGAN

11 MODELS IN FOUR SIZES

TWO 3/8 YD. MODELS
Bearcat Jr. . . . 15,000 lbs.
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TWO 3/4 YD. MODELS
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He *specializes* in transport flying . . . knows his job . . . you can depend on him to "get you there" in foul weather, or fair.

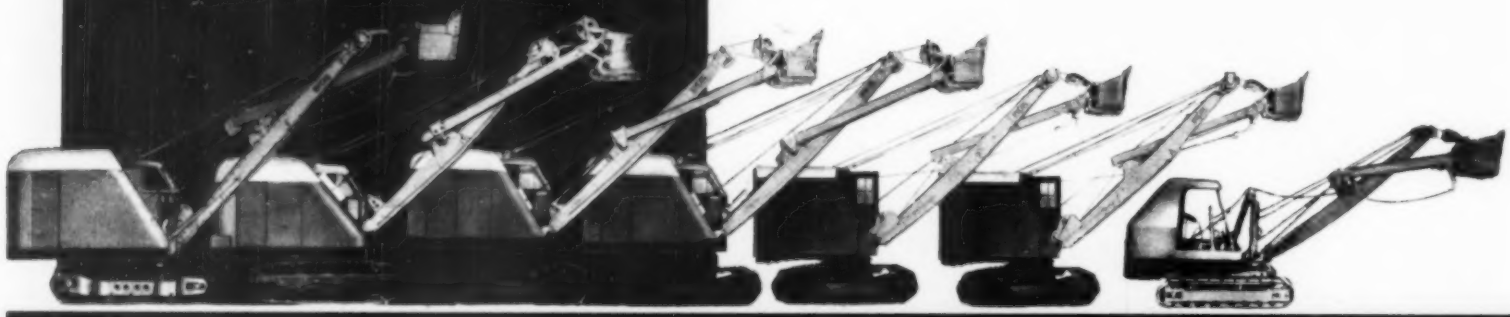
As air passengers trust the pilot, his skill, his knowledge, so can you depend on The Byers Machine Co. in the field in which it specializes.

Byers builds power shovels and cranes in the portable sizes . . . 3/8 yd., 1/2 yd., 5/8 yd. and 3/4 yd. In these four sizes Byers offers you 11 separate models for various applications.

Performance records of Byers shovels and cranes in the four portable sizes are outstanding because Byers engineers and production departments are masters in their lines. Years of experience have developed their skill, their knowledge of "what it takes" to make substantial, fast, economical and reliable shovels and cranes in 3/8 to 3/4 yd. sizes.

You can depend on any of Byers 11 "portable" models. Why not get acquainted with them today?

List the sizes of machines you can use. Byers will promptly mail you complete catalogs on each separate model and job performance reports.



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3/8 · 1/2 · 5/8 · 3/4 YD. MODELS

J&L *Precisionbilt* GILMORE ROPE
HELPS KEEP YOUR EQUIPMENT WORKING AT LOW COST

You can depend on J & L Gilmore Wire Rope to help keep your shovels, buckets, drags and other equipment working efficiently, because it has the strength, flexibility and abrasion-resistance to stand up under hard, continuous service.

Precisionbilt Gilmore Rope is made exclusively of J & L Controlled Quality Steel — on the world's newest wire rope making machines, which work to a tolerance of 1–1000 of an inch.

When any of your earth-moving or material-handling equipment needs wire rope — or when you order new equipment — specify J & L Precisionbilt, the rope you can depend on for safety and economy. Write today for your copy of our catalog on J & L Precisionbilt Gilmore Wire Ropes.

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GILMORE WIRE ROPE DIVISION

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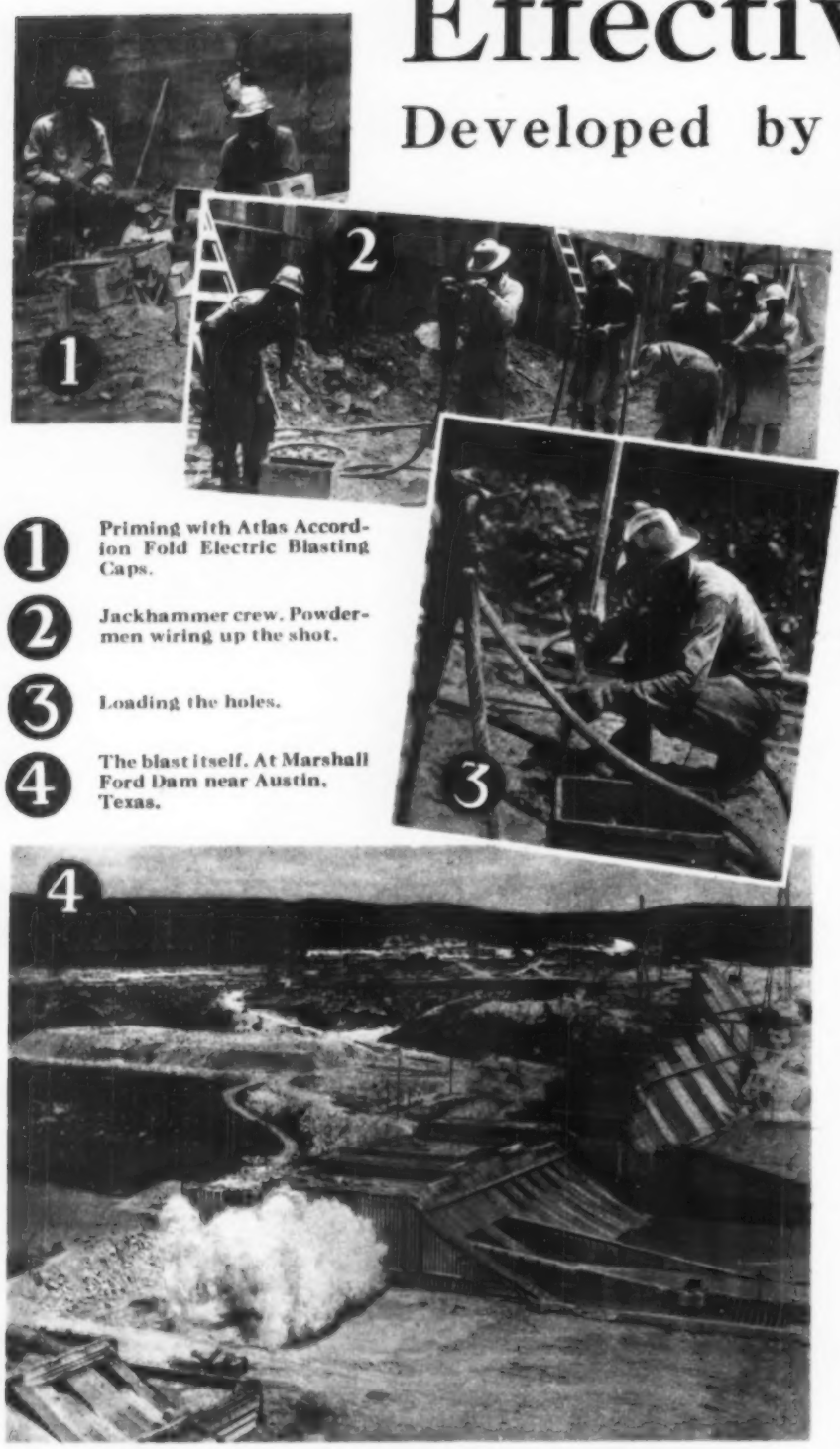
Effective Control

Developed by the Combination of

ATLAS METHODS

ATLAS
Electric Blasting Caps

ATLAS Explosives



1. Priming with Atlas Accordion Fold Electric Blasting Caps.
2. Jackhammer crew. Powdermen wiring up the shot.
3. Loading the holes.
4. The blast itself. At Marshall Ford Dam near Austin, Texas.

No story of the six million dollar Marshall Ford Dam could be complete without a report of the explosives and blasting methods used.

On this huge operation, Atlas Explosives were used exclusively—more than 300,000 pounds! The results, in both economy and effectiveness, were more than satisfactory.

In regard to detonators, the contractors said: "Our success with Atlas Electric Blasting Caps was the best in our experience."

For construction men throughout the country, the combination of Atlas Methods, Atlas Electric Blasting Caps, and Atlas Explosives means *better blasting*—and better blasting pays!

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

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ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

Above—Chas. H. Spiekerman's fleet at Saginaw, Michigan.

Below—Mr. Spiekerman (left) examining part of the portable testing equipment used by M. J. Volz, the Standard Automotive Engineer at Saginaw. W. N. Taylor, Standard Oil representative, (right) points to exhaust gas analyzer.

THIS SAGINAW FLEET NOW USES 25% LESS OIL

There is a wide variety of equipment in the Charles H. Spiekerman fleet shown above. When a Standard Automotive Engineer finished checking this fleet, practically every unit from the semi-trailer to salesmen's cars showed some improvement. The average saving was about 24% in gasoline and 25% in motor oil.

On the semi-trailer Mr. Spiekerman finds that he now makes his Detroit run—about 220 miles round trip—without adding any oil. Before the Engineer's checkup, and before changing to Iso-Vis Motor Oil, he added a quart or more of oil each trip. And a more expensive oil than Iso-Vis at that.

VALVE TROUBLE ENTIRELY ELIMINATED FOR TRUCK FLEET

On finding that his shop costs have been reduced approximately 15% through the help of a Standard Automotive Engineer, a Missouri truck line operator writes:

Gentlemen:

"In checking into my operation, I find a great deal of good has been done by your engineer, who made a survey of our fleet about ten months ago. He started a campaign to keep oil filters and air cleaners in good condition.

"We were having considerable trouble with sticking valves and I believe that his work has completely eliminated this trouble.

"I wish to take this opportunity to thank the Standard Oil Company for the wonderful cooperation in this work and in trying to assist us in getting from your products the results and service for which they were purchased."

P. B. Rickcords, Automotive Engineer, Peoria, Ill., checks fuel pump pressure.

SAVES 19% FOR EAST PEORIA SAND AND GRAVEL CO.

That 19% saving wasn't on gasoline alone but on all operating costs for a dragline, a gasoline locomotive and a number of large, 10-wheel dump trucks. But that was only part of the saving that a Standard Automotive Engineer was able to help this fleet owner make.

In addition, his thorough checkup of the fleet pointed out spots where trouble might occur. Repairs could be made before a complete failure of these parts tied up the equipment. This resulted in more reliable operations—less time in the shop—more power on the job. That meant a lot to this fleet where trucks operated 24 hours a day.

Let a Standard Automotive Engineer show you how he works and where these economies can be made in your fleet. If you are in the 13 Midwestern states served by these Engineers call your Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois.

FIRST IN SERVICE
FOR FIFTY YEARS
STANDARD OIL (IND.)

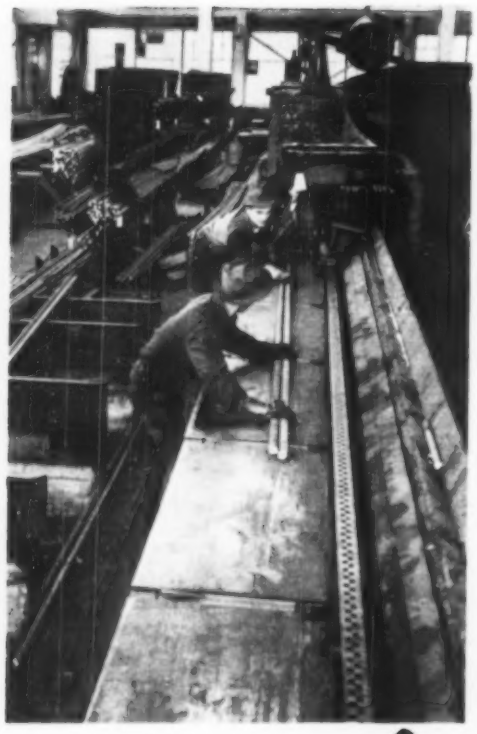
F. A. Barnes (left), Automotive Engineer, Quincy, Ill., explaining importance of air cleaner maintenance to shop foreman.

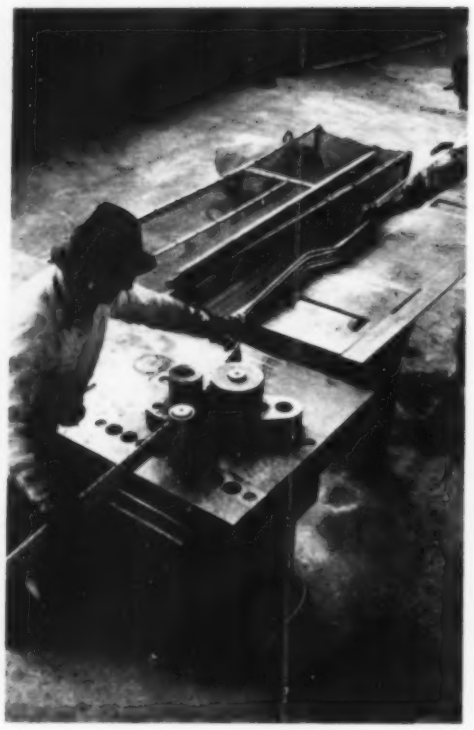
STANDARD OIL COMPANY (INDIANA)

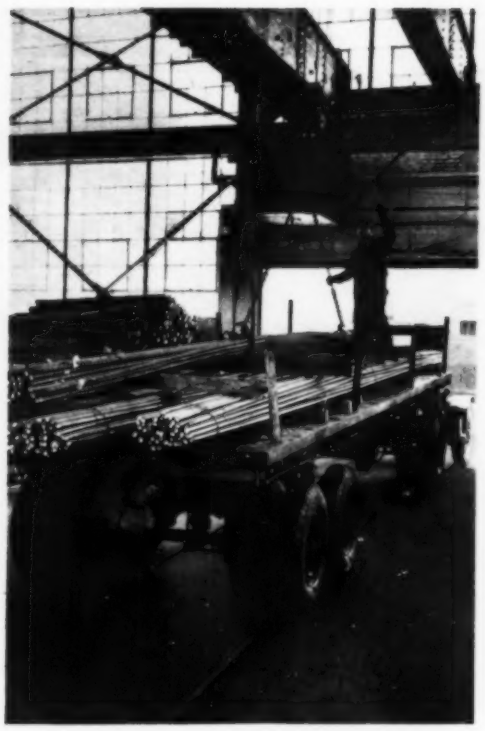
AUTOMOTIVE ENGINEERING SERVICE LOWERS MILEAGE COSTS

BETHLEHEM REINFORCING BARS

from 15 key sources







Cut to length

Bent to shape

Delivered on time

There's a Bethlehem reinforcing bar warehouse in major construction areas throughout the United States. These 15 well-stocked sources of reinforcing steel are located for prompt shipments to builders and contractors by rail, highway and water.

Complete shearing and bending equipment at each warehouse is ready to meet the specifications on your order. Delay is kept at the minimum by large warehouse capacities and smooth-functioning shipping personnel.

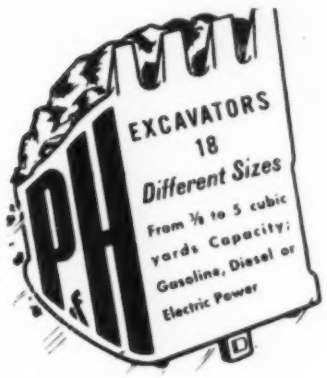
Next time you need reinforcing steel, get in touch with the Bethlehem warehouse nearest to your job.

BETHLEHEM STEEL COMPANY, General Offices: Bethlehem, Pa. Warehouses: Atlanta, Baltimore, Boston, Buffalo, Chicago, Danville, Detroit, Johnstown, Pa., Los Angeles, New York, Philadelphia, Pittsburgh, St. Paul, San Francisco, Seattle.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

When you replace an old type ½ yd. machine weighing 43,000 lbs. with a ½ yd. P&H that weighs only 22,000 lbs., you'll find reason, too, for enthusiasm! "Of all welded construction," says Mr. Lunder, "there has never been a sign of anything getting loose in the frame work, and the gears and shafting run very smoothly which would indicate that they are rigidly supported by the frame." That's one of the big advantages in P&H design. It saves time, saves repair bills, cuts production costs. That's why Mr. Lunder's next machine was another P&H. Thousands of alert contractors have proved these things. Why not you?



Write for literature on the size and type that interest you. Address the Harnischfeger Corporation, 4494 West National Ave., Milwaukee, Wis.

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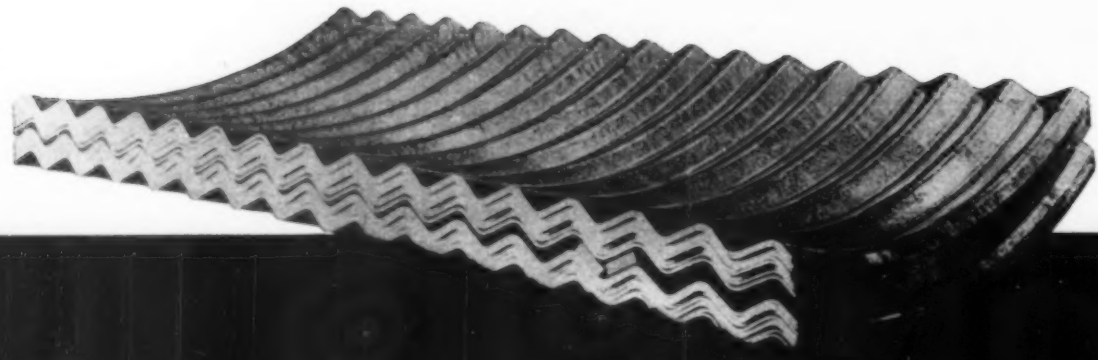
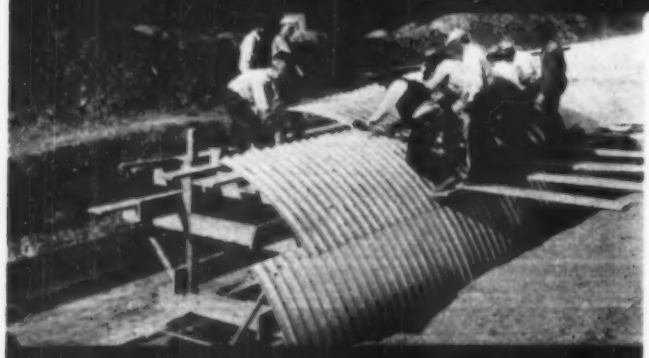


Speed work... Trim costs

WITH ARMCO MULTI PLATE



Time and money were saved in constructing this large outfall sewer by using a Multi Plate arch set on a floor of concrete. No costly formwork or heavy equipment was needed.

By using Armco Multi Plate Pipe for this 165-inch diameter inverted siphon, the contractor saved $6000 and completed the job in half the time estimated for other materials.

An unskilled crew of 6 men erected this 13-foot span Multi Plate bridge in just 5 hours. The only tools required were six spud wrenches, four hand hooks and some 6 x 6 braces.

FOR BIGGER PROFITS IN 1939 meet the demand for large drainage structures with Armco Multi Plate. You'll land more jobs, complete them in half the time, and cut your overhead costs to rock bottom.

How are these results possible with Multi Plate? Chiefly because the heavy-duty corrugated iron plates come to your job ready for quick assembly. Bolting them together to fit specifications is almost as simple as tightening a wheel on your car. No skilled labor, costly formwork or heavy machinery is needed. And once the structure is finished, it can immediately be backfilled with earth. This shortens construction time to hours or days and assures "fool-proof" results at low cost . . . even in the coldest weather.

No wonder successful contractors everywhere are discovering that "there's more profit in a Multi Plate job." Find out for yourself this year. Plates are quickly available for full-round structures up to 15 feet in diameter; and for arches with spans up to 25 feet. See your local Armco representative or write directly to Armco Culvert Mfrs. Assn., Middletown, Ohio.

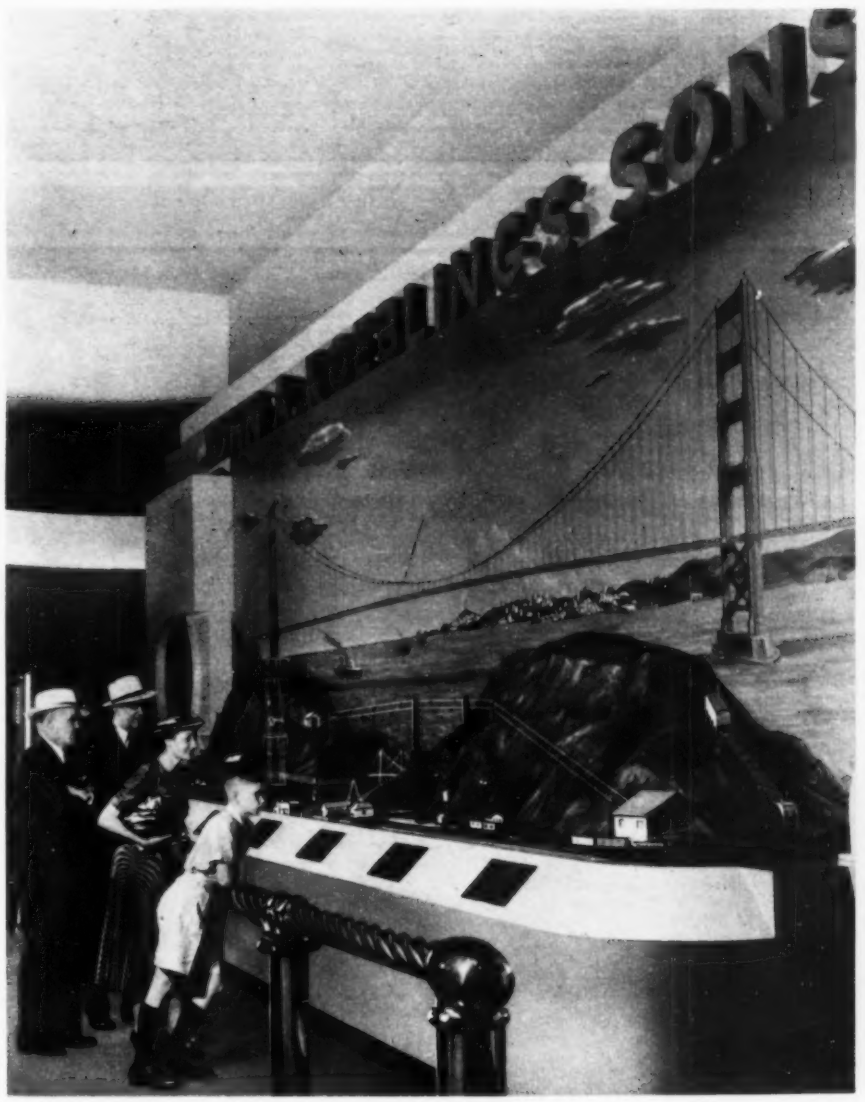
Armco MULTI ARMCO PLATE

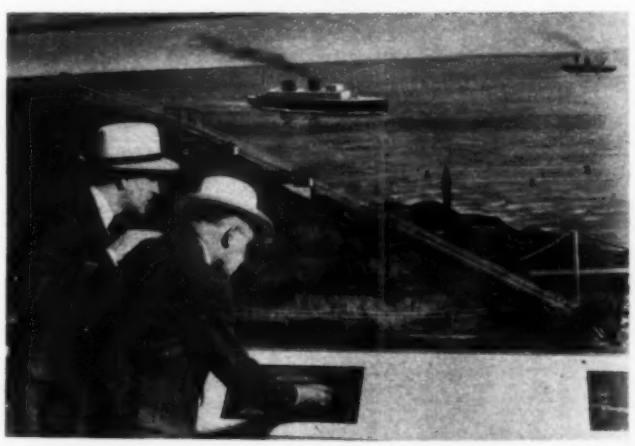
MULTI PLATE

Thrills

...for you and your family at the New York World's Fair!

WHEN YOU COME, BE SURE TO VISIT THE ROEBLING EXHIBIT!





"I WANT YOU TO SEE THIS, JACK. It's that Roebling Passenger Tramway I was talking to you about. Somebody used his head when he put in these blueprints so engineers can study the construction details."

TO YOU and your family . . . a hearty invitation to visit the Roebling Exhibit at the New York World's Fair!

No matter what your business activity . . . engineering, contracting, mining, railroading, manufacturing, building management or what-not . . . you will find that this Roebling Exhibit is designed specifically to interest *you*—to help make *your* visit instructive and keenly enjoyable.

Action every moment! Mining, construction, dredging and other industrial operations in full swing! All in miniature . . . with excavating, hoisting, and conveying equipment incredibly exact in detail. Even the tiny wire ropes and cables are exact duplicates of their full-size counterparts!

So come . . . you and your family. We will give you a royal welcome. And remember . . . we are in the Metals Building, directly in front of the Trylon and Perisphere.

JOHN A ROEBLING'S SONS COMPANY, TRENTON, N. J.

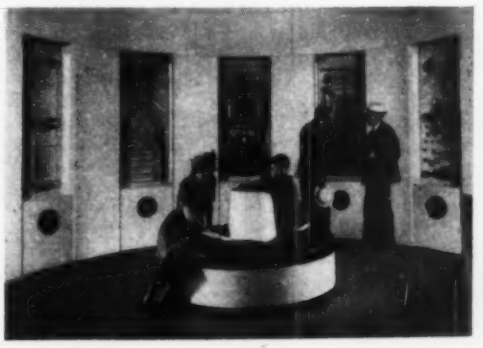
ROEBLING

WIRE ROPE & FITTINGS • ELECTRIC WIRE & CABLE • FLAT WIRE • WOVEN WIRE FABRICS • WELDING WIRE • OTHER WIRES & WIRE PRODUCTS

"THAT, MY DEAR, is the world's largest dredge, the Crest. I've seen her—and this replica sure looks natural. Why, it's identical with the original, down to the last boom line and hoisting rope!"

"THIS WILL INTEREST YOU, JOHNNY . . . a whole yillage in miniature. See, there's a school, a church, a fire house, some stores—even a water tower and a railroad station. And look . . . here comes the train!"

"WHILE MARY AND JOHNNY ARE RESTING, suppose you and I look over this interesting exhibit of Roebling Products. There are more of them in the other rotunda, at the opposite end of the exhibit."



The Rhoads Contracting Co., Ashland, Pa., started buying MARIONS in 1912

TO DATE THEY HAVE BOUGHT 19 MARIONS

Modernize WITH

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SHOVELS • DRAGLINES • CRANES
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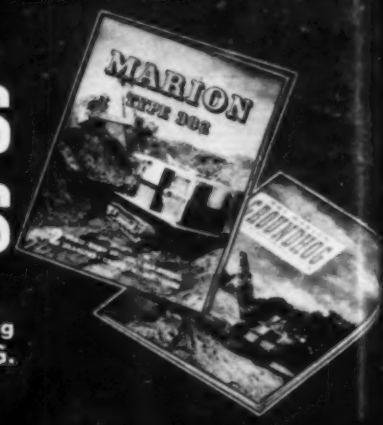


Write The MARION STEAM SHOVEL CO., Marion, Ohio, U. S. A., for bulletins describing the size of Marion you are interested in, and a copy of the latest GROUNDHOG.

Established in 1919
A McGRAW-HILL PUBLICATION

Construction Methods and Equipment

ROBERT K. TOMLIN, Editor

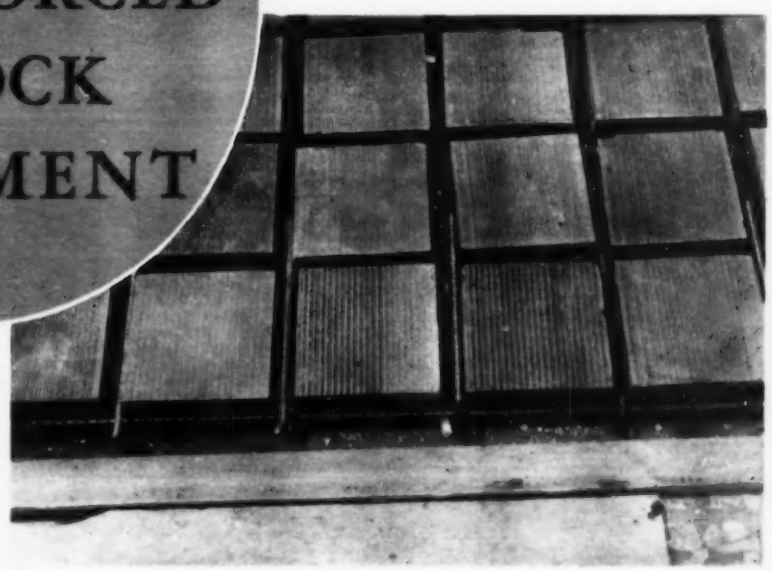
Volume 21 | July, 1939 | Number 7

Ohio Builds Test Section of REINFORCED BLOCK PAVEMENT

HEAVY WOOD TEMPLET resting on edge forms strikes off sand cushion on top of leveling course of stabilized limestone screenings.

WITHIN 9-IN. SQUARES of bar mat reinforcement supported above sand cushion, workmen place 8x8x3¾-in. vitrified paving block.

SAND-CEMENT GROUT dumped on surface of block is spread with squeegees until joints are filled.



IN ONE PORTION of pavement section reinforced with individual bars, transverse bars are bent into 13-in. U at edge of pavement to reinforce top of slab.

USING VITRIFIED PAVING BLOCK 8x8x3¾ in. in size, the Ohio Department of Highways last August built a 200-ft. section of reinforced grout-filled brick pavement on U.S. 23, 4½ mi. north of Delaware. The vitrified block were laid on a 1-in. sand bedding course spread over an old waterbound macadam base which had been widened to 21 ft. and leveled with limestone screenings stabilized by addition of flake calcium chloride. Three types of reinforcement were installed in grout-filled joints of the pavement, the various types being used in equal lengths of roadway.

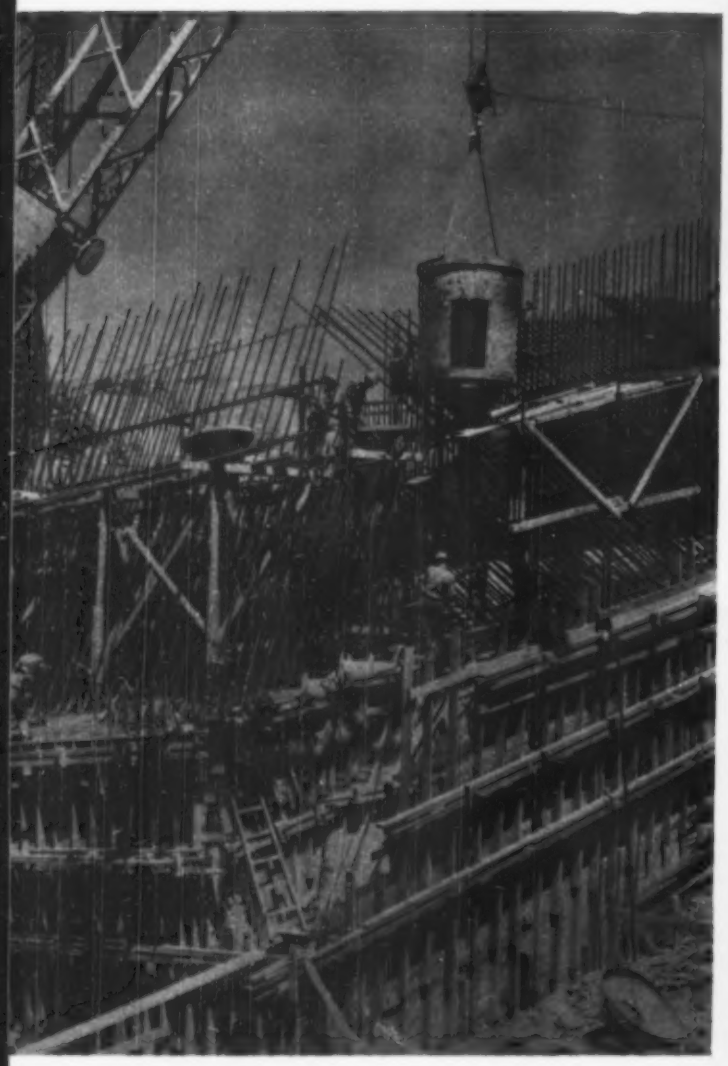
In one section the reinforcement consisted of bar mats of ⅜-in. round bars spaced 9 in. c. to c. in both directions and supported ¾ in. above the bedding course. Adjacent mats were joined by ⅜x30-in. deformed bars wired to the mats. The two other types of reinforcement made use of individual ⅜-in. round deformed bars and ¼-in. welded wire mats similar to the bar mats.

In the squares formed by the bars or wires, 8x8-in. vitrified blocks were placed to make a neat, uniform pattern. To bed the blocks, a workman rolled them with a hand roller weighing 12½ lb. per inch of width. Portland cement grout, distributed in carts on plank runways, was dumped and squeegeed over the surface to fill the joints. Cotton covering mats were kept wet to cure the grout.

Reinforced vitrified block pavement, exclusive of base, costs about $1.00 per square yard less than standard vitrified brick and concrete base. Its use may be extended for surfacing compacted foundations similar to the base upon which the test section was placed, thus salvaging the existing roadway.

This Month's "NEWS REEL"

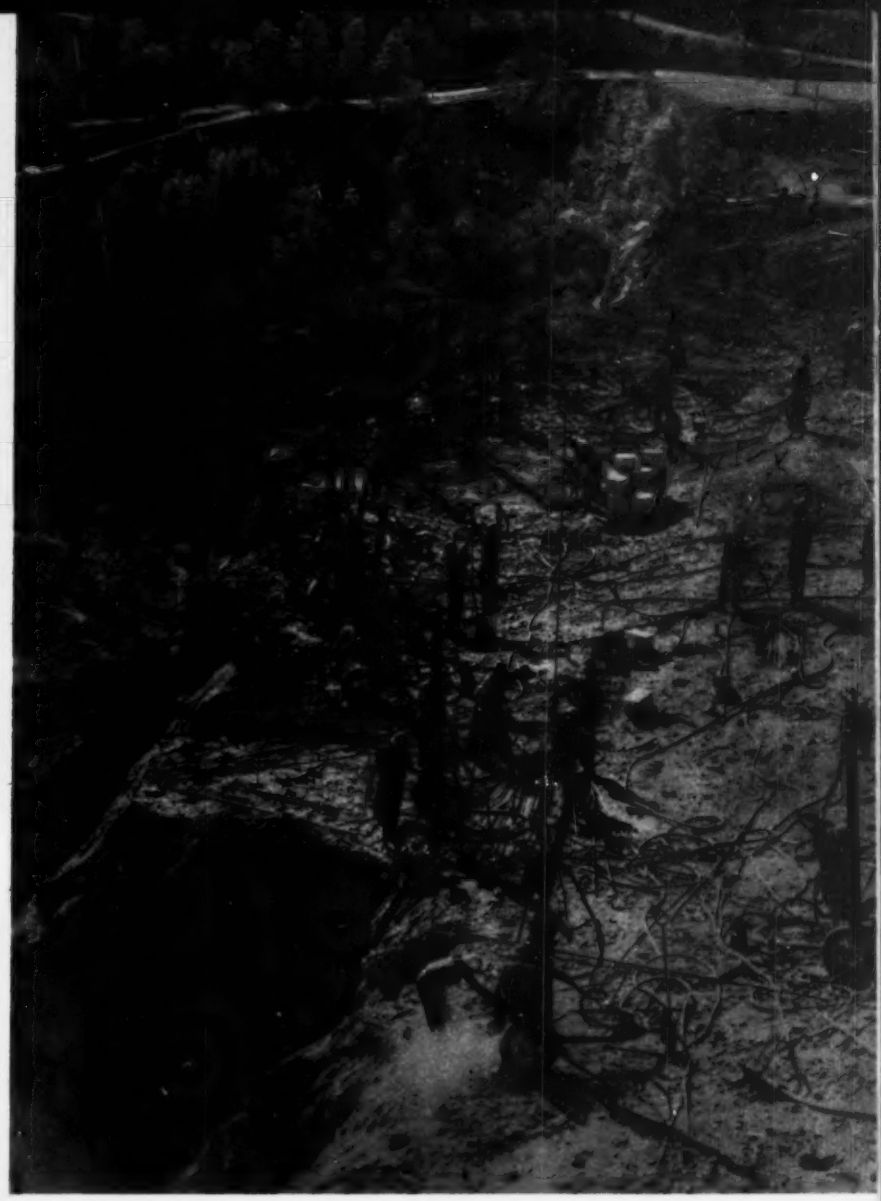
POSSUM KINGDOM DAM on Brazos River, Texas, is first structure of massive buttress type with flat deck. It is 189½ ft. high above lowest foundation and 2,740 ft. long (including terminal dike). Central overfall spillway is flanked by bulkhead sections. Design feature is cushioned seating of deck slabs on buttresses. Dam costing $4,600,000 is being built by Ambursen Engineering Corp. for Brazos River Construction and Reclamation District, John A. Norris, general manager.



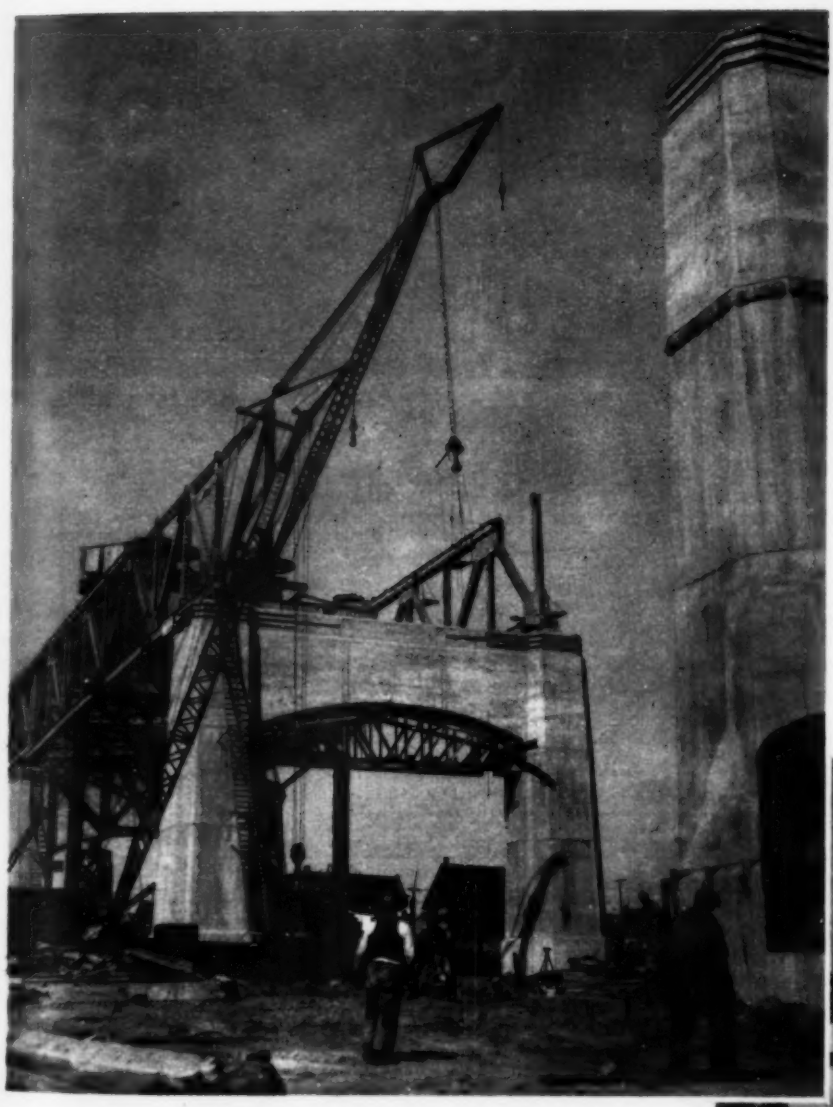
AT HANSEN DAM, world's largest dry fill 122 ft. high, containing 13,000,000 cu.yd. of earth, under construction for flood control in Los Angeles County, California, Guy F. Atkinson Co., contractor, pours concrete in outlet structure with aid of 4-cu.yd. Gar-Bro buckets discharging into hopper of steel drop chutes.

CONSTRUCTION KIBITZERS ASSEMBLE June 6 at Rockefeller Center, New York City, for first national convention of Sidewalk Superintendents' Club. After critically watching power-shovel excavate foundation for the Center's fourteenth and final building at 48th St. and Sixth Ave., the delegates were officially greeted by GEORGE J. ATWELL (inset) New York contractor and honorary president of local chapter, who welcomes Miss RUTH BURROW of Jersey City, N. J., vice-president, while H. CLAY (Corn Cob) JACKSON, of Fort Worth, Texas, looks on.

NEW ALLEGHENY RIVER BRIDGE, (below) connecting East Ohio St., Pittsburgh, Pa., with Herrs Island, is set up on temporary supports along side of old span which is moved off its piers to make way for new structure. New bridge containing 370 tons of steel, is 252 ft. long and carries two-lane roadway and sidewalk.

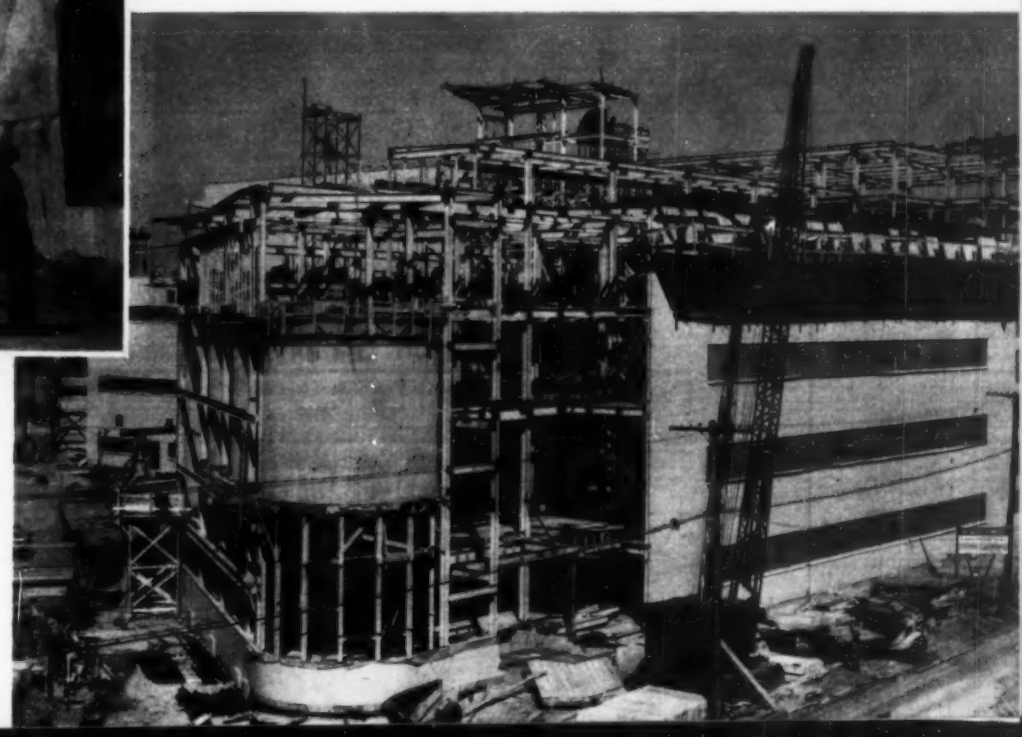


BATTERY OF WAGON DRILLS, mounted on pneumatic-tired carriages, puts down blast holes at Shasta dam, 560-ft. high concrete structure being built in California for U. S. Bureau of Reclamation by Pacific Constructors, Inc. With volume of 5,600,000 cu.yd. of concrete, structure will be world's second largest concrete dam.



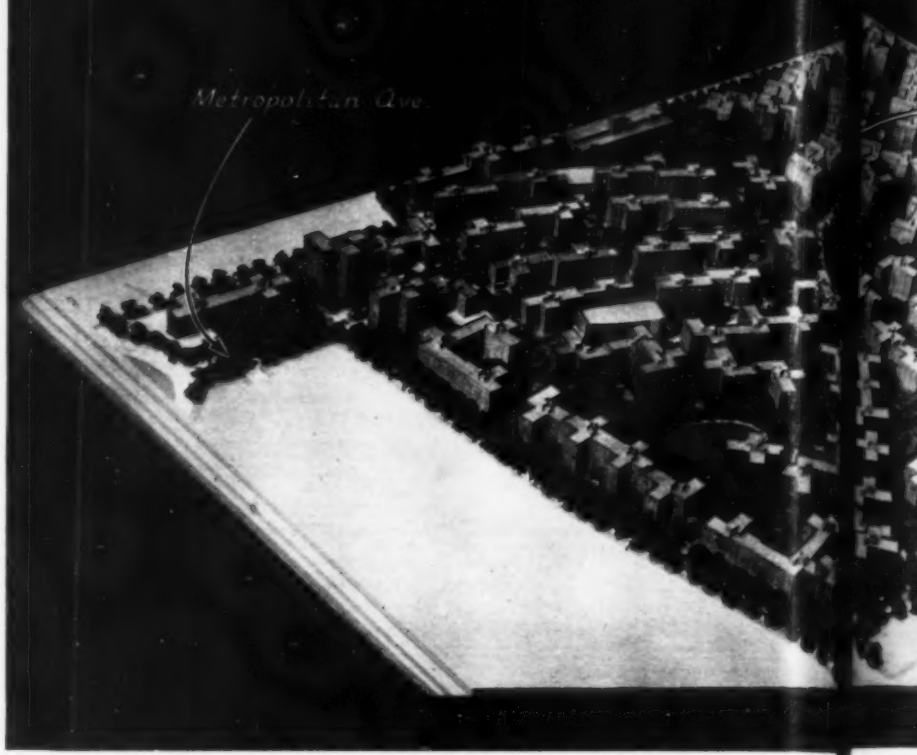
STEEL VIADUCT APPROACH to northerly end of Meeker Ave. bridge over Newtown Creek, Brooklyn, N. Y., nears completion as traveler on structure, assisted by long-boom crawler crane on ground, sets structural members on concrete piers for American Bridge Co. Including approaches and 300-ft. steel truss spanning creek, project of New York City Department of Public Works has total length of 6,150 ft. and will form link with circumferential highway being built in Boroughs of Brooklyn and Queens.

GLASS BLOCK AND STRUCTURAL WELDING (below) feature construction of this modern plant for Church & Dwight Co. (baking soda) at Syracuse, N. Y., designed and built by The Austin Co., of Cleveland, Ohio. Steel erection was handled by long-boom crawler crane.



TRUCK-MIXED C

Fills 12,000,000 Sq. Ft. of Floor Ar



COVERING ONLY 27.4 PER CENT of 129-acre tract, 51 apartment houses with community and service buildings (such as theaters and central steam plant) will provide healthful, airy, sunlit accommodations for 42,000 persons. Apartment buildings, seven to twelve stories in height, are made up of various combinations of three basic-plan units, these units being used 171 times in all. Each unit has central core of elevators and stairs.

USING TRUCK MIXERS for the first time to mix and deliver cinder concrete, the Washington Concrete Corp., New York City, with a fleet of nine 5-yd. units distributes 100 cu.yd. per hour of no-slump cinder mixture from a job batching plant to various buildings of the largest housing project in the United States, where the firm's floor crews complete a daily average of 40,000 sq.ft. of arches in 8 hr. or less under subcontract with Starrett Bros. & Eken, Inc., New York City, general contractor for the Metropolitan Life Insurance Co. on its huge apartment community, Parkchester, in the Bronx, New York. Installation of large-capacity discharge buckets in the drums of the 5-yd. units has enabled the mixers to discharge cinder concrete into hoppers at the bases of tower elevators faster than the hoist buckets can take material away from the hoppers. At the present rate of construction, the floor contractor by the end of this year will have completed 70 per cent of a total of 12,000,000 sq.ft. of cinder arches in the buildings.

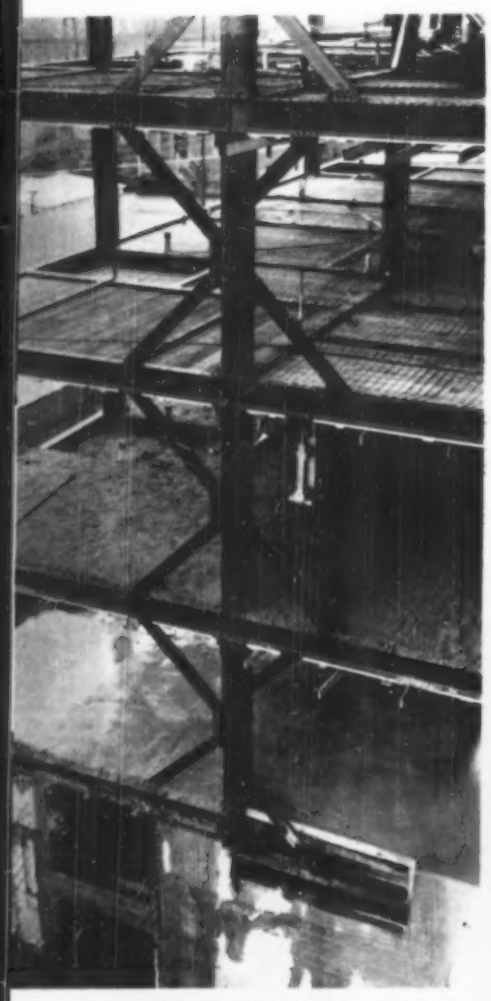
Metropolitan Housing Project — On a 129-acre tract laid out to provide pleasant and healthful surroundings for future tenants, the Metropolitan Life Insurance Co. is erecting 51 fireproof apartment buildings (171 units) containing 12,269 living units of 42,000 rooms for families of moderate income. Construction is going forward in accordance with a progress schedule which calls for completion and occupancy of some units before the end of the year. Buildings range in height from 7 to 12 stories. Structures of less than nine stories have brick load-bearing walls and interior steel columns and floor framing; buildings of nine or more stories are steel-frame throughout.

Ample land area is available on the 129-acre site. Buildings cover 27.4 per cent of the land, and streets take 21.2 per cent, leaving 51.4 per cent for gardens, play space and landscaped lawns. A business and shopping center providing neighborhood stores and two theaters is included in the plan, near the main point of access to the community. Parkchester is financed completely by the Metropolitan Life Insurance Co. as an investment and is designed to be economically self-sustaining without benefit of any subsidy.

Floor Arches — Beam spacing in the floor frames varies from about 6 to 10 ft. Between the beams are cinder-concrete flat floor arches 4 to 5¼ in. thick, reinforced with welded wire mesh. On top of the cinder concrete is placed a ¼-in. finish of sand-cement topping floated or troweled to a smooth, dense surface. Beam soffit forms and arch forms are suspended by wire hangers from the steel members. For the 12,000,000 sq.ft. of floor arches in the project, the Washington Concrete Corp. will place about 250,000 cu.yd. of cinder concrete.

Cinder Concrete Production — Ordinary methods of producing cinder concrete by installing batching and mixing equipment at each of the 51 apartment buildings would have involved serious problems in delivering and storing materials, as well as in moving and setting up plant equipment. An economical solution of these difficulties was found in the operation of a fleet of truck mixers served by a single batching plant erected near one corner of the roughly rectangular tract. Any doubts concerning truck mixers' ability to handle and discharge no-slump concrete were promptly dispelled by demonstrated efficiency of units on the job.

Batching Plant—Truck mixers are loaded at a Butler batching plant capable of charging a 5-yd. drum every 2 min. Three-compartment 150-cu.yd. steel bins hold sand, cinders and bulk cement, which are discharged through manually controlled gates into a 5-yd. batcher equipped with a beam scale. A Robbins 24-in. by 160-ft. belt conveyor, driven by an International 38-hp. gasoline engine, carries sand and cinders up an 18-deg. slope from a receiving hopper to the bins. The capacity of the belt is 300 cu.yd. an



THREE STAGES of floor construction — top to bottom: (1) arch forms and wire mesh reinforcement; (2) cinder concrete arches; (3) ¼-in. sand-cement topping.

COVERED BELT CONVEYOR 160 ft. long delivers sand and cinders from receiving hopper to overhead bins of batching plant.

D CINDER CONCRETE

or Arches on America's Largest Housing Project

Model Photo
Air View

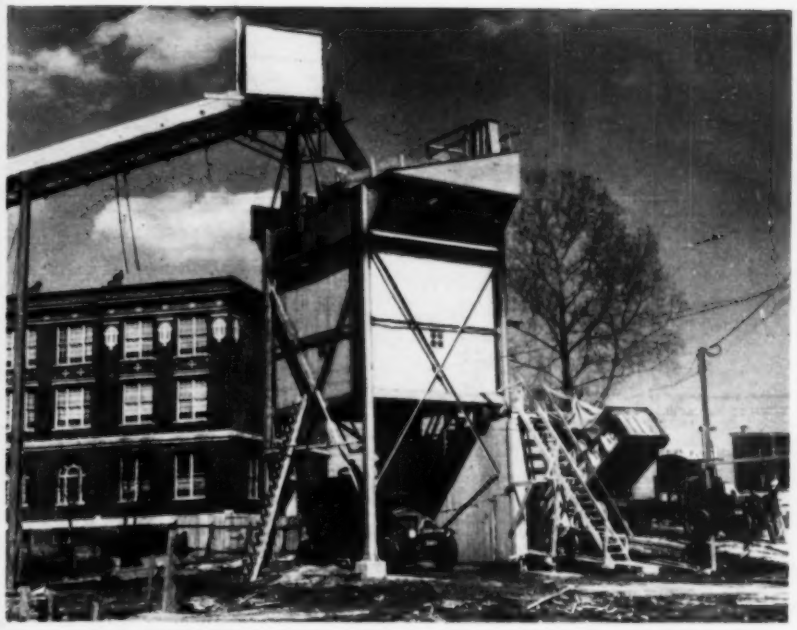
hour. Bulk cement is delivered by covered trucks to an inclosed hopper from which it is raised by bucket elevator to the proper compartment in the overhead bins.

At a nearby railroad yard, another Butler plant unloads the bulk cement from hopper-bottom cars. An under-track screw feeds a bucket elevator which puts the material in an overhead bin. Cement is drawn off into the trucks through a fabric spout.

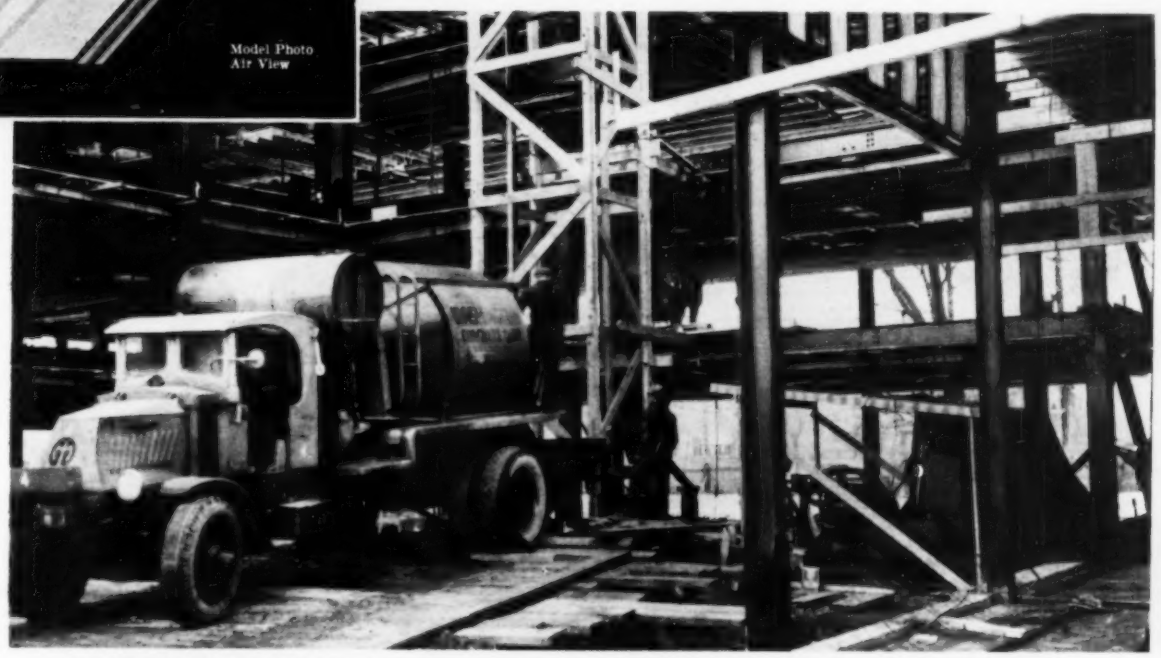
Mixer Fleet — To mix and deliver concrete to several buildings simultaneously at the rate of 100 cu.yd. an hour, the cinder arch contractor purchased six Rex and three Jaeger 5-yd. truck mixers, mounted on Mack trucks equipped with Cummins diesel engines. Average haul from the batching plant to the buildings is about ½ mi., and the trucks ordinarily complete a round trip in about 20 min.

Discharge time for a 5-yd. mixer unloading no-slump cinder concrete was 3 min. with old-type discharge buckets in the drum, but this time has been reduced to 2½ min. through substitution of larger-capacity discharge buckets. Once a truck has backed into position, the mixer discharges faster than a tower bucket can take concrete away from the hopper, even when the bucket is raising concrete only to the second floor.

Scattered Operations — By April 8, ten of the buildings were equipped with hoist towers for cinder concrete. At this time (prior to expanding the mixer fleet to nine 5-yd. units), the contractor was operating six 5-yd. Rex Moto-Mixers supple-



BULK CEMENT, discharged from end-dump truck into inclosed hopper alongside plant, is raised by bucket elevator to overhead compartment in steel bins.



DISCHARGING 5-YD. BATCH of no-slump cinder concrete in 2½ min., truck mixer delivers material to hopper at base of bucket hoist.

FROM TOWER HOPPER filled by hoist bucket workmen charge 6-cu.ft. carts used to distribute cinder concrete over wooden runways on floor.

Bulk cement unloading plant
Batching plant for cinder concrete
(New Street)
Metropolitan Ave.
White Plains Road
Pelham Bay subway elevated line in Westchester Ave.

BY JUNE 1, several buildings of first group are inclosed and ready for interior work, looking toward occupancy before end of year. Construction will progress from section to section in sequence around 129-acre site. Quadrant layout, with two main intersecting streets, gives easy access, greater beauty and improved safety at one-fourth street mileage required by ordinary rectangular plan.

RAPID CONSTRUCTION SCHEDULE, calling for completion from foundations to roof in space of few months requires placing cinder concrete arches for 12,000,000 sq.ft. of floors at rate of 40,000 sq.ft. per day.

mented by two rented 4-yd. Moto-Mixers. On a typical day, the eight truck mixers delivered concrete to six buildings, four of these structures taking 700 cu.yd. of cinder concrete for about 40,000 sq.ft. of arches and three of the buildings receiving 80 cu.yd. of sand-cement mixture for finishing 52,000-sq.ft. of floor. Floor finishing on this day was completed in 7 hr., and 700 cu.yd. of cinder concrete could have been placed in the same time if another truck mixer had been available for deliveries. Each arch crew needs three trucks to keep it supplied with cinder concrete. With eight trucks hauling the two classes of concrete, a full 8-hr. day was required to place 700 cu.yd. of cinder arches.

Several photographs show methods of delivering and distributing concrete. The towers are equipped with 31-cu.ft. buckets operated by

CONSTRUCTION FORCE ON FLOOR ARCHES
Parkchester Housing Project

Metropolitan Life Insurance Co.
General Contractor, Starrett Bros. & Eken, Inc.
Subcontractor on floor arches, Washington Concrete Corp.

CARPENTERS

2	Carpenter foremen	On arch forms
4	Deputy carpenter foremen	
71	Carpenters	
2	Carpenter labor foremen.	Helping carpenters and stripping forms
2	Deputy labor foremen...	
97	Carpenter laborers	
1	Carpenter foreman	Cutting, erecting and maintaining hoist towers
2	Carpenters	

REINFORCING MESH

1	Lather foreman	Clipping and rolling mesh reinforcement
1	Deputy foreman	
26	Lathers	
4	Lather laborers	

CINDER CONCRETE

3 Concrete foremen.
68 Concrete laborers, pouring cinder concrete arches and giving screed finish.
3 Concrete laborers, erecting floor hoppers to receive concrete dumped by hoist bucket.

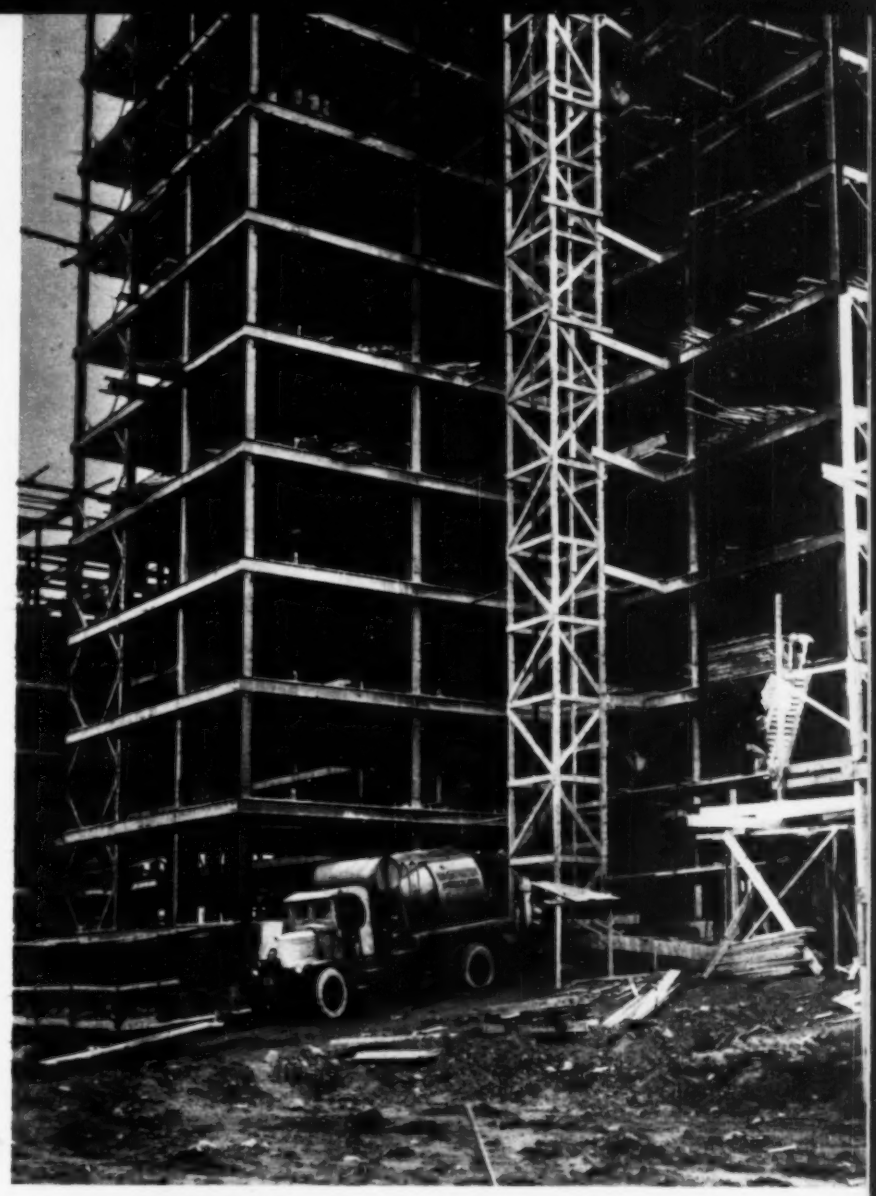
FLOOR TOP FINISH

2 Cement mason foremen.
19 Cement masons, setting screeds, pulling up ¼-in. finish (1:2 mix) on top of cinder concrete and giving it (1) float finish to receive wood floor or (2) steel trowel finish in kitchens to receive linoleum.

HOISTING ENGINEERS, MECHANICS, TRUCK DRIVERS

3 Hoisting engineers.
2 Mixer engineers, one at bulk cement unloading plant and one at batching plant to run cement elevator and aggregate conveyor.
4 Batching plant men, one to weigh batches, one to load trucks with dry batches and water, one at material receiving hopper where sand and cinder trucks unload, and one truck dispatcher.
1 Oiler, to oil, gas and grease all equipment.
1 Mechanic for fleet of nine mixer trucks.
9 Mixer truck drivers.
8 Men for supervision and office staff.

336 **Total force employed.**



BUCKET HOIST TOWER at each building lifts cinder concrete delivered to base hopper by truck mixers. Hoists are moved from building to building as needed.

gasoline hoists which are moved from one building to another as required. At the bases of the towers are 3-yd. hoppers into which the truck mixers discharge their loads. A brief time study of a bucket running to the tenth floor of one building gave 25 sec. for hoisting and a total of 41 sec. for hoisting, dumping and returning to the base hopper.

Arch Forms — To complete floor arches at the rate of 40,000 sq.ft. a day, the contractor employs 817,000 sq.ft. of forms, involving about 2,000,000 b.-ft. of lumber. On April 1, with about 500,000 sq.ft. of concrete arches in place, the form crew was 140,000 sq.ft. ahead of the concrete gang. The contractor expected concrete to catch up with formwork in about two weeks after this date.

Construction Force — A total of 336 men is required for all operations involved in supplying, placing and finishing 40,000 sq.ft. of floors per day. An accompanying tabulation gives a breakdown of this working force according to classification.

Administration — Parkchester is being built for the Metropolitan Life Insurance Co. by Starrett Bros. & Eken, New York City. The Metropolitan's Board of Design consists of R. H. Shreve, chairman, Gilmore D. Clarke, Irwin Clavan, Robert W Dowling, Andrew J. Eken, George Gove and Henry C. Meyer, Jr.

Floor arches are constructed under subcontract by the Washington Concrete Corp., New York City, with E. Scudellari, president, in direct charge of the work.

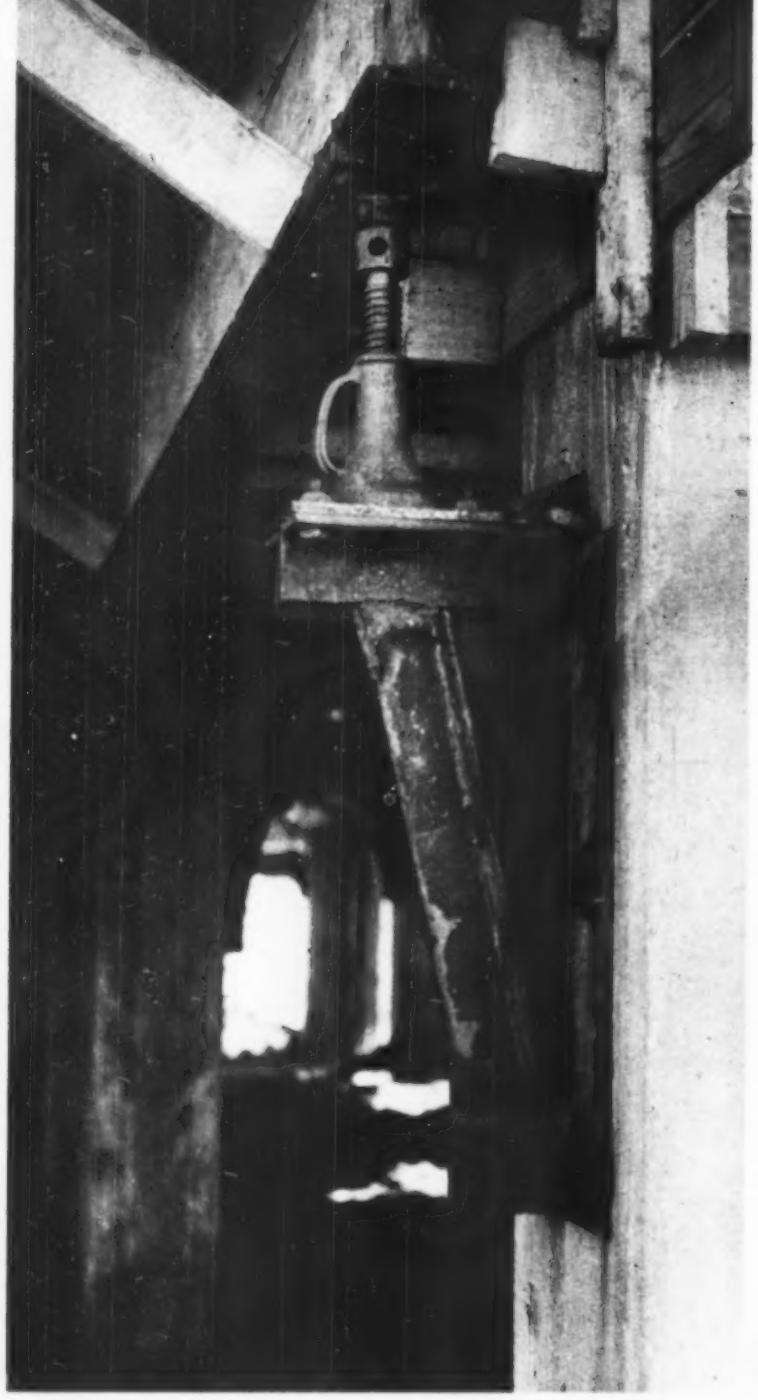
TABLE SAW speeds cutting of battens used in building fireproofing forms for structural steel.

NO-SLUMP CINDER CONCRETE is dumped from carts and spread by hand shoveling.

Forms for Bridge Ramp Set Accurately With

SCREW-JACKS

On Column Brackets

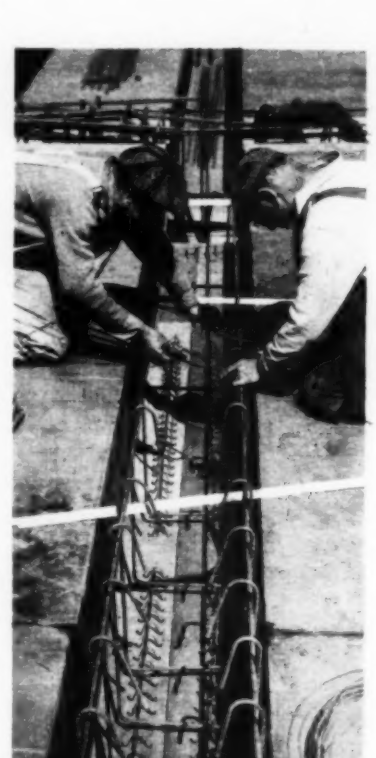


ON WELDED BRACKET bolted to face of column is seated screw-jack which supports I-beam supporting formwork for roadway deck.

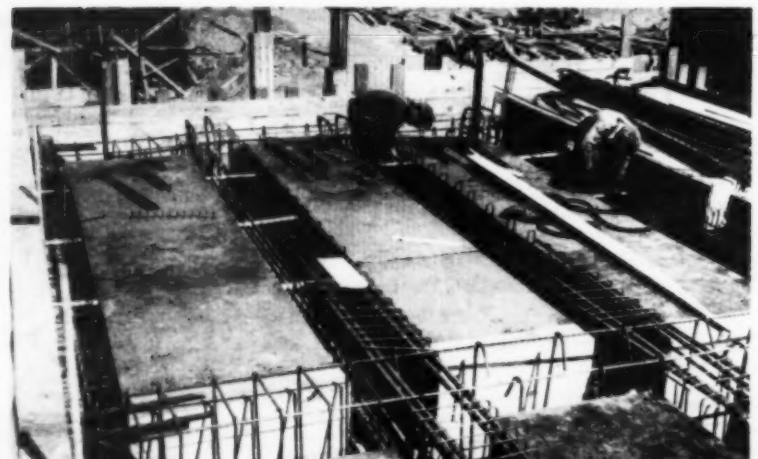
JACKS PLAYED a major role in the field methods which Reiss & Weinsier, Inc., contractors of Brooklyn, N. Y., devised for setting forms for the concrete deck of the south approach ramp to the Meeker Ave. bridge across Newtown Creek, dividing line between the boroughs of Brooklyn and Queens, New York City. This structure, a project of the city's Department of Public Works, forms an important link in the circumferential highway which is being built to form a loop around the metropolitan area of Long Island and connect with the main routes of its parkway system. With its approaches, the Meeker Ave. bridge has a total length of 6,150 ft., including a 300-ft. steel truss crossing Newtown Creek and viaducts consisting of structural steel and of reinforced concrete design. The approach structures carry two 32-ft. concrete roadways, separated by a 4-ft. safety island or dividing strip.

The south, or Brooklyn, ramp, with which these notes deal, is a reinforced concrete viaduct 2,142 ft. long, with deck supported by beams and girders carried by concrete columns. Its roadway rises at a grade of 3.75 per cent to join the structural steel span and is built with a transverse pitch of 1 in. in 10 ft. to shed water from the center toward each side of the structure. These deck slopes, both longitudinal and transverse, were the controlling factor in the scheme of supporting the roadway forms which the contractors developed and which called for some means of easy and accurate adjustment of forms to proper line and grade. Batteries of screw-jacks on temporary brackets attached to the columns of the structure proved to be the solution to the problem.

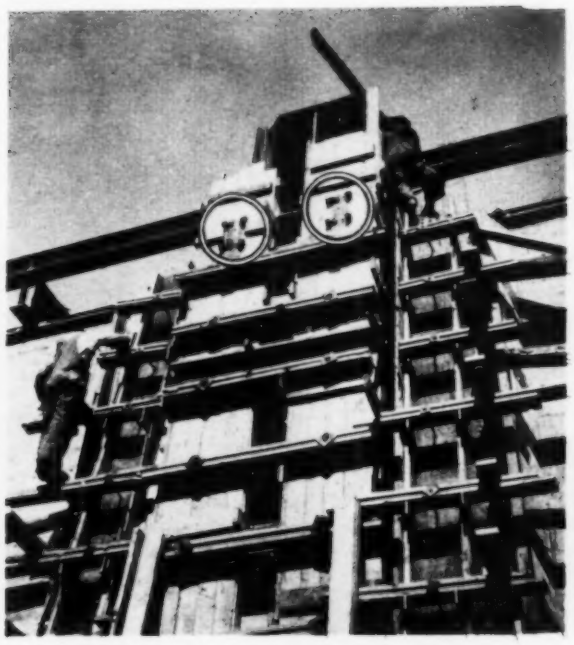
Spacing of the columns supporting the inclined roadway varies both longitudinally and transversely in different sections of the approach viaduct, due to the necessity of increasing the width of the structure between Porter and Varick Aves. to accommodate traffic entrance and exit ramps parallel to the elevated roadway. At the lower or south end of the inclined viaduct the bents of the concrete structure are spaced 19 ft. 9 in. apart; the columns of each bent are spaced 16 ft. 11½ in. on centers to carry four transverse spans of the roadway deck. At Varick Ave., however, the wider roadway requires six transverse deck spans of 19 ft. 9 in. each, with bents at this location



STEEL REINFORCEMENT is placed with aid of wire chairs on bottom of form to keep U-shaped bars proper distance from lower face of concrete girder when cast.



SHEET STEEL PANS. bent to shape of inverted U, are used to form concrete floor system of viaduct.



SPECIAL TEMPLET insures correct spacing of bolt holes cast in concrete columns to provide for attachment of brackets to carry form-setting screw-jacks.

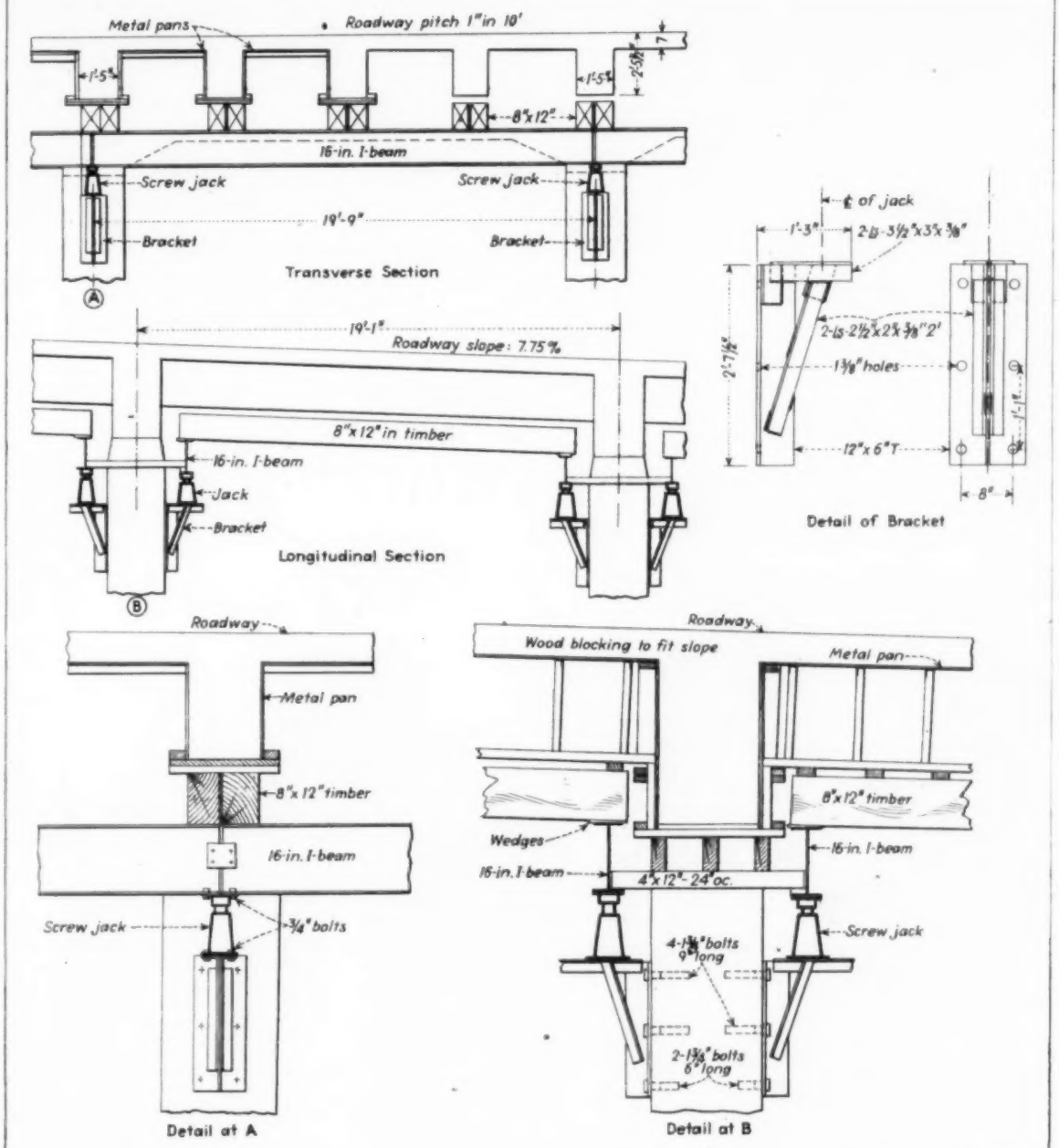
IN CHARGE OF FIELD OPERATIONS for Reiss & Weinsier, Inc., Brooklyn contractors, are JACK SLOAN (left) and RANDOLPH WEINSIER.

spaced 19 ft. 1 in. on centers. While the general scheme of form support is uniform throughout the concrete approach structure the following details and dimensions refer to the section near Varick Ave. carrying the wider roadway.

Column Brackets — As illustrated in the accompanying drawings and pictures the forms for the concrete deck are carried by screw-jacks set on brackets attached by anchor bolts to opposite faces of the 2-ft. 3-in. square concrete columns. As concrete is poured for each column, holes for attaching the brackets are cast near the top by inserting 1¾-in. Richmond screw anchor bolts horizontally through the wood forms so that they are embedded in the concrete as it is poured. The proper spacing of these anchor bolt holes is accomplished by nailing to the outside of the column form of wood a metal templet along the vertical edges of which are welded six guide rings through which the bolts are inserted, passing through holes bored in the form lagging. After the concrete has set and before the forms are stripped the templets and bolts are removed, leaving threaded holes into which the anchor bolts for attaching the brackets are later screwed.

Details of the brackets are illustrated in sketches herewith. Measuring 2 ft. 7½ in. in overall height and extending 1 ft. 3 in. out from the face of the concrete column, each bracket is made up of a T-shaped structural steel vertical backbone to which are welded a horizontal shelf of a pair of angle-irons and angle-iron knee-bracing. In the horizontal legs of the shelf angles are bored

(Continued on page 102)

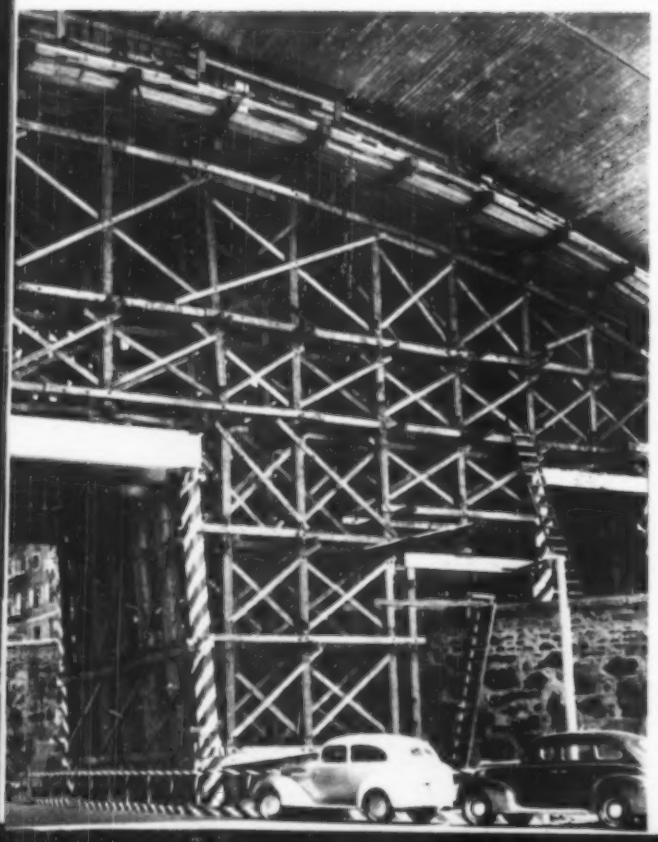


DETAILS OF JACK SUPPORT of viaduct formwork, showing how brackets are attached to faces of concrete columns by anchor bolts.

SET UP IN SOUTH POSITION, falsework supports arch concrete placed behind ring stone erected on centering. Girder span has been replaced in changed location to bridge 50-ft. opening for Riverside Drive traffic. In background are concrete hoist tower and scaffolding for facing existing anchorage of George Washington bridge, which crosses Hudson River with 3,500-ft. suspension span.

Truss Design of Mobile Timber Falsework

Permits Removal of Lower Sections To Provide Clear Span During Transfer



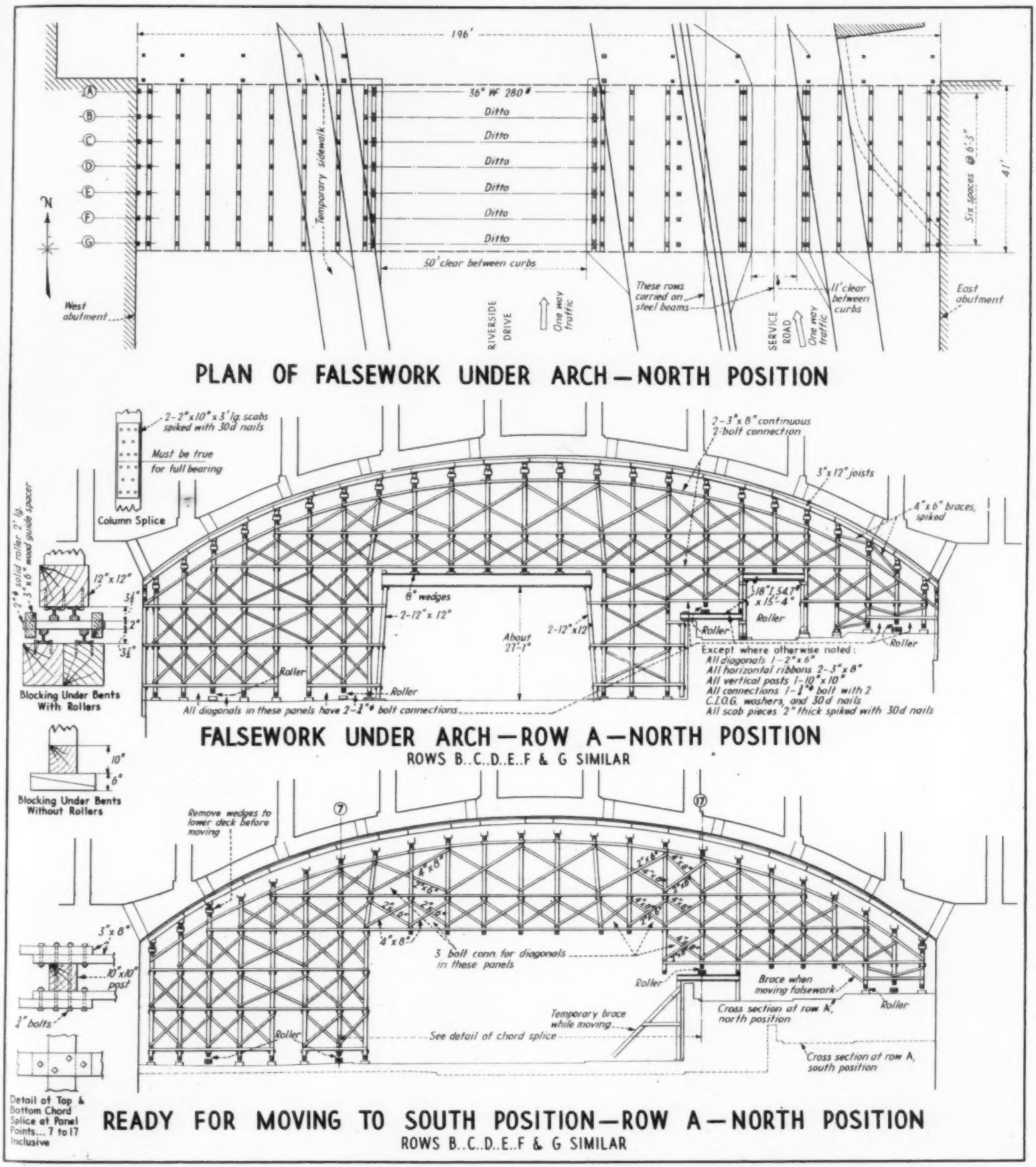
ERECTED IN NORTH POSITION (left) to support arch load, falsework has number of bents resting on steel girder spans over Riverside Drive, masonry retaining wall and service ramp. Three falsework bents behind light-colored car will be dismantled up to horizontal chord above steel girders for movement to south position.

BY INCORPORATING truss construction in the upper tiers of mobile timber falsework used to build reinforced-concrete barrel arches of 196-ft. span on both sides of an existing arch crossing Riverside Drive, New York City, Walter Kidde Constructors, Inc., contractor for the Port of New York Authority, developed a design which permitted removing lower sections of the falsework to maintain traffic openings and to clear obstructions while the centering was being rolled under the old bridge from the first set-up to the second. Constructed as part of a $1,000,000 contract for expanding the Manhattan approach to the George Washington bridge, the two new arches add 41 ft. 2 in. to each side of the existing arch, 65 ft. wide. Traffic on Riverside Drive and a parallel service ramp had to be maintained through the falsework at

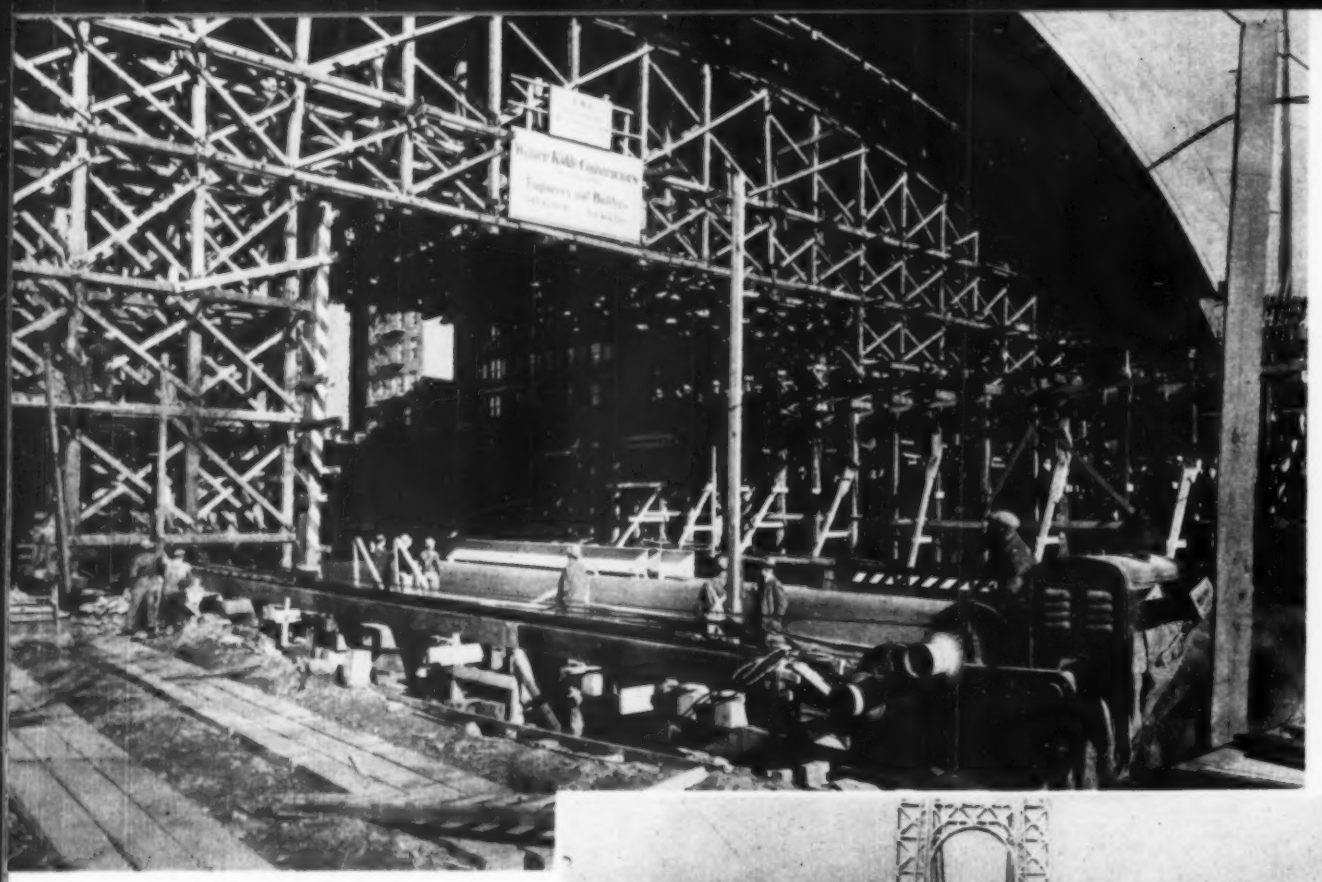
all times during the course of the work. The skew angle at which the two trafficways intersected the arch, coupled with the variable cross-section contours produced by the service ramp and its masonry retaining wall, presented a surface condition which required a long open span in the falsework during movement from its first position on the north side of the bridge to its second position on the south.

In adding the two flanking arches alongside the existing span, the Port Authority made one important modification in the original arch dimensions. The two new arches spring from the abutments at practically the same elevation as the existing arch, but for esthetic reasons the rise of the new arches was reduced to 30 ft., 6 ft. less than the rise of the old arch, to produce a flatter and more pleasing curve. As the two new structures conceal the old span, the difference in arch rise is not apparent to an observer outside the bridge.

Timber Falsework — Overall dimensions of the concrete arches and of the timber falsework are indicated by accompanying drawings. Maximum live load of arch concrete on


196'
36" W. 280#
Ditto
Ditto
Ditto
Ditto
Ditto
Ditto
Temporary sidewalk
50' clear between curbs
Six spaces @ 6'-3"
41'
West abutment
East abutment
RIVERSIDE DRIVE
One way traffic
These rows carried on steel beams
11' clear between curbs
SERVICE ROAD
One way traffic
PLAN OF FALSEWORK UNDER ARCH — NORTH POSITION
2-2"x10"x3'lg. scabs spiked with 30d nails
Must be true for full bearing
Column Splice
2-3"x8" continuous 2-bolt connection
3"x12" joists
4"x6" braces, spiked
8" wedges
2-12"x12"
About 27'-1"
2-12"x12
5/8" I.S.A.T. x 15'-4"
Roller
Except where otherwise noted:
All diagonals 1-2"x6"
All horizontal ribbons 2-3"x8"
All vertical posts 1-10"x10"
All connections 1-¾" bolt with 2 C.I.O.G. washers, and 30d nails
All scab pieces 2" thick spiked with 30d nails
All diagonals in these panels have 2-¾" bolt connections
Blocking Under Bents With Rollers
FALSEWORK UNDER ARCH — ROW A — NORTH POSITION
ROWS B..C..D..E..F & G SIMILAR
Blocking Under Bents Without Rollers
Remove wedges to lower deck before moving
3 bolt conn. for diagonals in these panels
Brace when moving falsework
Temporary brace while moving
See detail of chord splice
Cross section at row A, north position
Cross section at row A, south position
Detail of Top & Bottom Chord Splice at Panel Points... 7 to 17 Inclusive
READY FOR MOVING TO SOUTH POSITION — ROW A — NORTH POSITION
ROWS B..C..D..E..F & G SIMILAR

TWO TRAFFIC OPENINGS and skewed retaining wall under bridge require clearing of long spans in trussed falsework to facilitate movement from north position to south position.



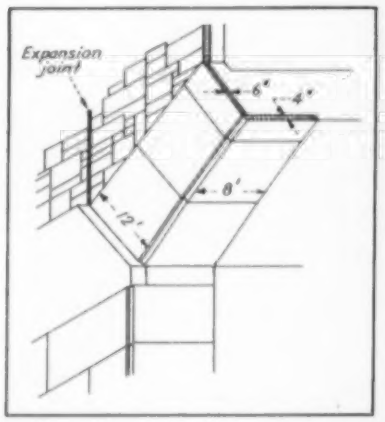
DOUBLE-DRUM HOISTS on two sides of Riverside Drive pull falsework under existing arch from north position to south position on four lines of rollers. One drum pulls falsework on track directly in front of hoist; second drum operates line reeved through snatch blocks to pull falsework on parallel track nearer abutment.

the centering was 3,250 tons. The falsework consisted of seven rows of 10x10-in. fir posts, with 24 posts in each row. Maximum vertical load on individual posts ranged from 16 to 26 tons. The falsework design was based on use of dressed lumber, assuming that a good grade of second-hand lumber could be obtained. After the job had been awarded the contractor could not find enough good second-hand lumber and, instead, used new full-size rough lumber, thus gaining an additional safety factor.

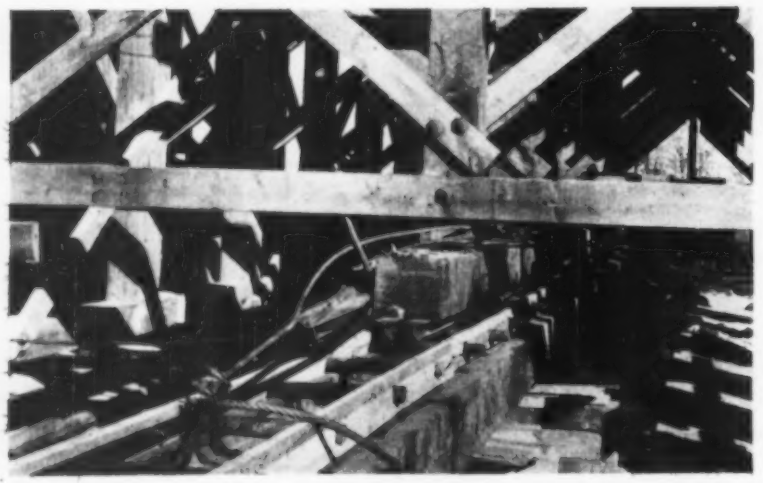
In both locations of the falsework, the posts above the traffic openings were supported on steel girders. These girders later were utilized in the structural steel framing which supports permanent bridge approach ramps over the arches. Double 12x12-in. posts supported the girders of

Locations of two arches crossing Riverside Drive
New approach ramp (similar ramp goes on other side)
Portal to vehicular tunnel (not previously used)

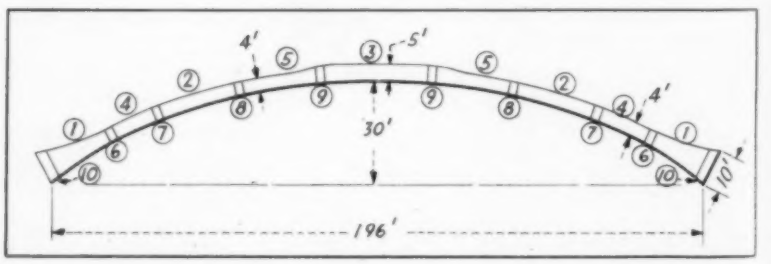
IMPROVED MANHATTAN APPROACH to George Washington bridge provides two new ramps giving access to streets and releases existing ramp to serve vehicular tunnel recently paved for use. New ramps cross Riverside Drive on concrete barrel arches.



ISOMETRIC VIEW at skewback shows ring stone for arch face and intrados cast monolithically with concrete barrel.



DOUBLE LINES OF STEEL RAILS (left) above and below 2-in.-diam. solid steel rollers provide track for rolling falsework. Hauling rope to second track passes around one sheave of block anchored to falsework bent.



ARCH CONCRETING proceeds in sequence indicated by numbered blocks and keys, all elements being poured to full 41-ft. 2-in. width of barrel.

the 50-ft. span across Riverside Drive. In the north position, these posts extended to rock, uncovered near the surface. In the south position, the posts rested on concrete spread footings resting on old fill.

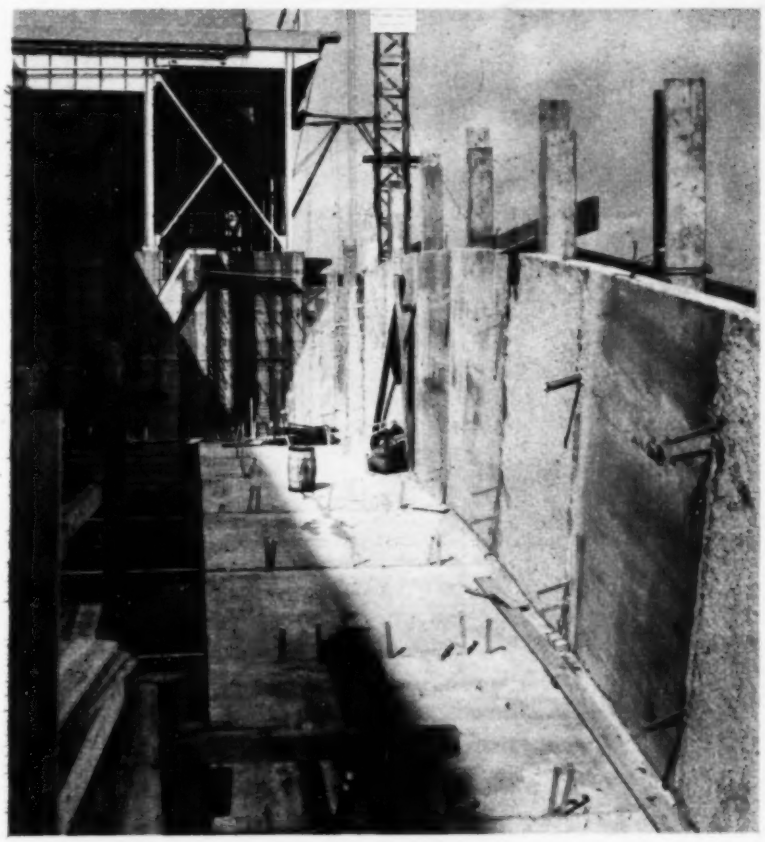
Dead load of the falsework and centering, ready for movement to the second position, was about 400 tons. The falsework moved on four lines of steel rollers. When the falsework was set up under an arch, each post in these lines rested on eight rollers spaced 8 in., c. to c. Maximum vertical load on a post resting on rollers in this position was 26 tons. With the live load removed and the falsework prepared for transfer on the four lines of rollers, the maximum reaction at the base of any post on the rollers was 15 tons. While the falsework was being rolled under the existing arch, the contractor's working drawings permitted a roller spacing of 2 ft. In the south position, the spacing was restored to eight rollers on 8-in. centers under each post in the four lines.

In the north position, longitudinal timber stringers under three of the roller tracks rested on sills supported by timber spread footings. The fourth roller track was supported by a steel and timber trestle over the parapet of the retaining wall alongside the service ramp. Under the existing arch and in the south position, the three roller tracks previously mentioned were supported by timber cribbing on timber sills. Posts of falsework bents not supported by steel girders rested on timber load-distribution sills in both the north and south position.

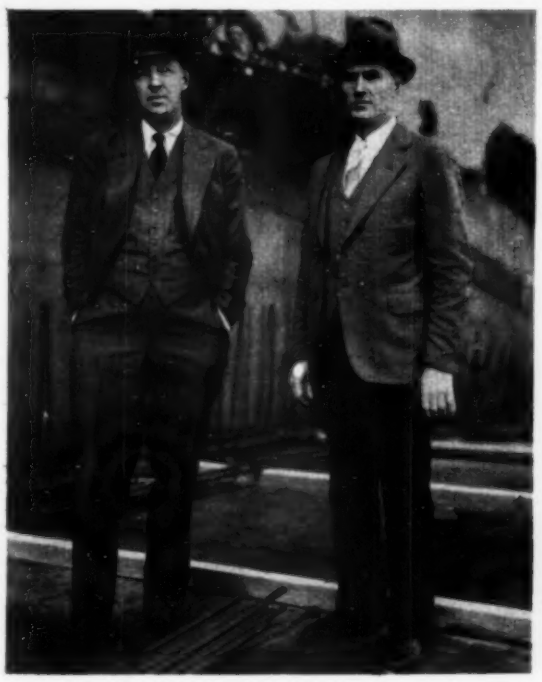
Moving Falsework—Details of the method of rolling the falsework on steel rails are indicated by accompanying photographs and drawings. To pull the falsework, the contractor used two double-drum gasoline hoists, the hoists being set in line with the two inner roller tracks, nearest Riverside Drive. One drum of each hoist was used to pull the falsework on the line of rollers directly in front of the hoist; a hauling rope from the second drum was reeved through snatch blocks to pull the falsework on the outer track, nearest the abutment. The falsework rolled easily and smoothly over the four tracks, putting little load on the hoists. While the falsework was being drawn from under the north arch, the forward movement was made in slow stages to permit concrete finishers working

(Continued on page 102)

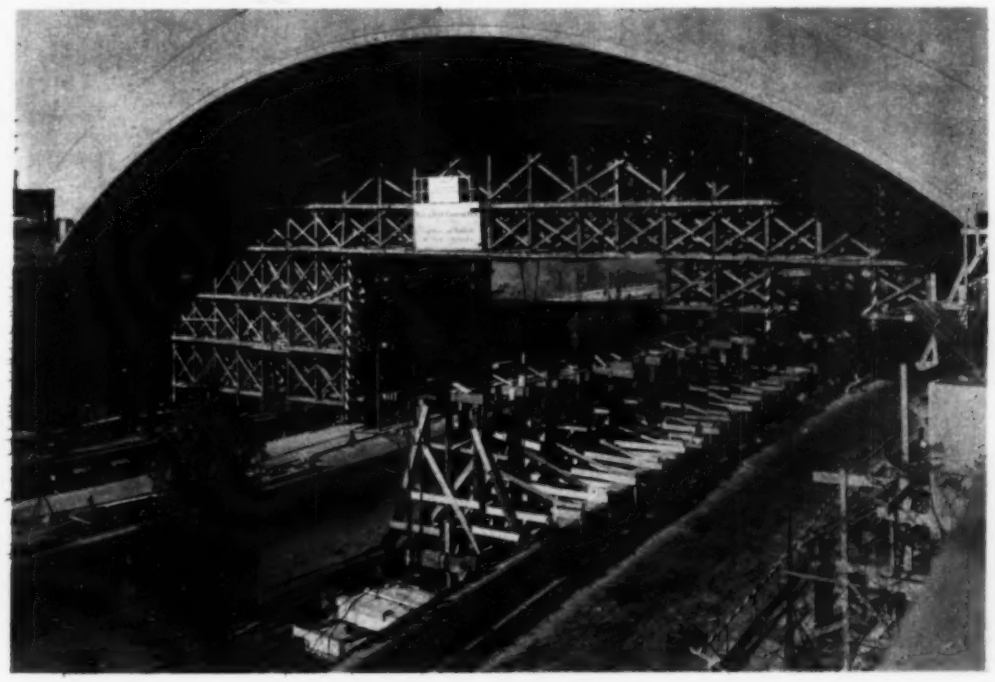
STEEL-AND-TIMBER TRESTLE in left foreground carries one roller track over parapet wall along service ramp in north position. Falsework is here being pulled under old arch to south position. Gunite wall inclosing structural framing above existing arch is being removed.



RING STONE consisting of thin slabs of sawn granite for arch face and intrados are erected on centering prior to placing of reinforcing steel and concrete.



DIRECTING OPERATIONS (below) for Walter Kidde Constructors, Inc. are CHARLES W. KNOWLES (left), general superintendent, and NIKOLAI PEDERSEN, superintendent, standing here on plywood arch form in front of cast-in-place concrete chair for reinforcing bars.

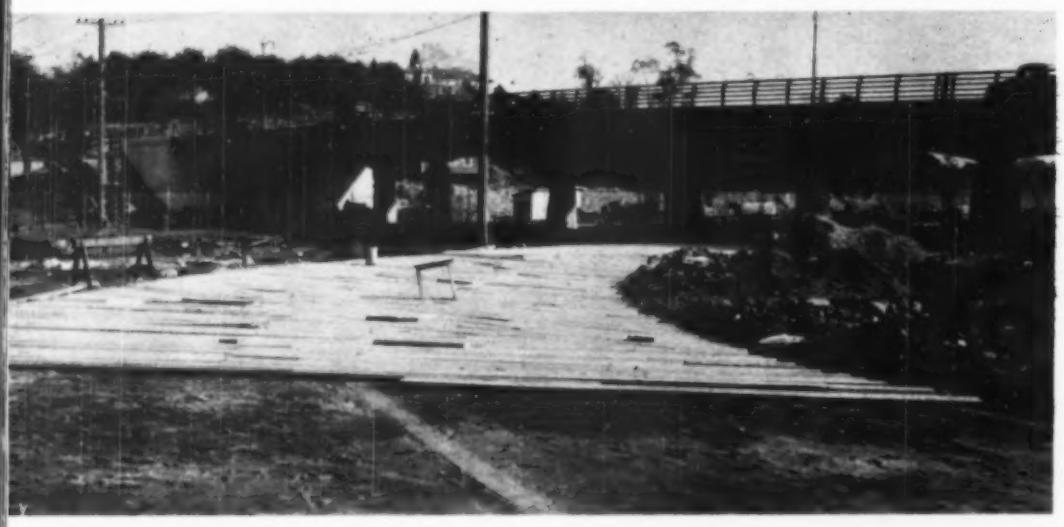


TIMBER BENTS (below) support level roller track over retaining wall parapet on east side of Riverside Drive, between drive and service ramp in foreground. Gunite curtain wall of existing arch span has not yet been touched on this side of bridge.

CORDUROY BASE

SUPPORTS WORLD'S FAIR ROAD ON MEADOW MUCK

TIMBER SLEEPERS set to line and grade on fill material are backfilled with sand, which is either tamped by hand or compacted with 5-ton roller.



FIRST LAYER of 2x12-in. planks is placed diagonally on sleepers, ready for nailing with 20 d. nails.

PARTIAL LIST OF QUANTITIES AND UNIT PRICES
CORDUROY BASE AND BITUMINOUS PAVEMENT

Evelyn Construction Co., Inc., Bronx, N. Y.

Total Bid — $121,243

Item	Quantity	Unit Price
Clearing and grubbing	Lump sum	$100.00
Unclassified excavation(borrow)	25,000 cu.yd.	0.30
Preparing fine grade	15,700 sq.yd.	0.20
Structural steel (bolts and nuts)	7,000 lb.	0.12
Misc. iron and steel	20,500 lb.	0.08
Bottom course broken stone	2,000 cu.yd.	4.00
Top course, bit. mac., cold-lay.	900 tons	9.00
Asphalt, pen. meth.	30,000 gal.	0.09
Tar, cold applica.	1,500 gal.	0.10
Top course, bit. mac., pen. meth.	1,200 cu.yd.	5.00
Preparation of subgrade	50,400 sq.yd.	0.04
Timber and lumber	480Mb.-ft.	45.00
Cinders, loose measure	1,800 cu.yd.	1.50
Timber drop inlets and manholes	15	40.00

SECOND LAYER of planks, laid at right angles to first layer, has joints staggered to avoid coinciding with bottom joints and with adjacent upper joints. Planks in two layers are nailed to each other with 20 d. nails at all joints and at intermediate points on not more than 2-ft. centers.

CURB CONSTRUCTION (right) keeps one step ahead of loose cinders dumped on corduroy base for spreading and rolling.

A SMALL CREW of carpenters, equipped with two electric saws and two electric drills drawing power from a pair of portable gasoline generators, laid 480,000 b.-ft. of lumber in corduroy base and timber curbs designed to support and retain bituminous pavement completed by the Evelyn Construction Co., Bronx, N. Y., for the State Department of Public Works on a section of Flushing Meadow in the New York World's Fair area. Designed by District 10 of the public works department, J. J. Darcy, district engineer, Babylon, L. I., to assure load distribution on earth fill over the unstable foundation material, the corduroy base consists of two layers of 2x12-in. planks laid at right angles to each other on 3x6-in. sleepers placed on the subgrade and backfilled with sand. The corduroy base lies in a plane, level for tangents and banked for curves, without provision for crown.

Designed crown of ¼ in. per foot was built into the pavement by placing cinder fill of 1-in. minimum compacted thickness between the timber curbs. On top of the crowned cinder fill, the contractor built a substantial pavement comprising 5 in. of broken stone, 3 in. of penetration macadam and 1 in. of cold-lay wearing surface, as indicated by an accompanying sketch. Roadways vary in width from 22 ft. on traffic loops and connecting drives at intersections to 50 ft. on a 400-ft. length of tangent. The Evelyn Construction Co. built about 11,000 sq.yd. of corduroy base and macadam pavement at a total unit cost approaching $4.25 per square

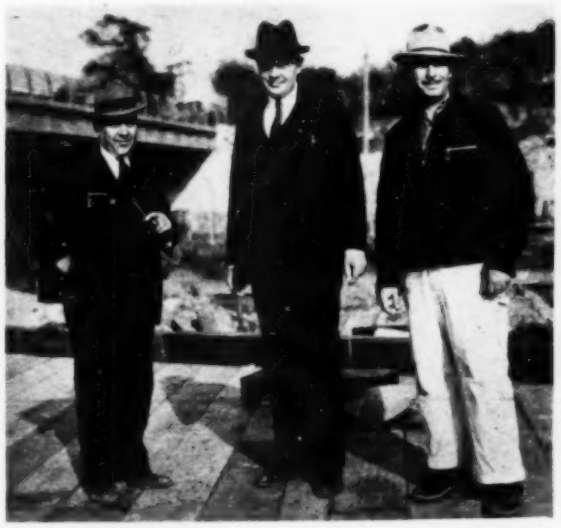
CURBS consist of 8x8-in. bottom timbers and 6x6-in. top timbers bolted to corduroy base through sleeper under planking.

TWO-MAN CROSS-CUT SAW shortens curb timbers to fit needs at drop inlet.

ACTIVELY IN CHARGE of construction, JOSEPH DE PACE, secretary, supervises job for Evelyn Construction Co., contractor.

ELECTRIC HAND-SAW capable of cutting 3-in. lumber trims 2x12-in. planks for corduroy base.

SLEDGE HAMMER drives ¾-in. bolt 21 in. long through drilled hole. Fill material under sleeper has been excavated to permit putting washer and nut on lower threaded end of bolt.

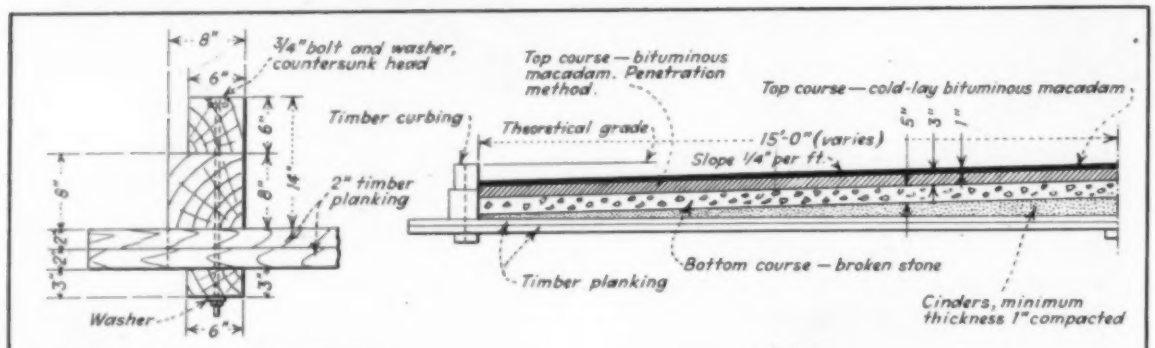


CORDUROY BASE. timber curbs and drop inlets are built with advice of DOMINICK MANDAGLIO (in white trousers), standing on timber base beside BENJAMIN DOKTORICH and JOSEPH De PACE.

ELECTRIC DRILL bores hole for ¾-in. bolt through curb timbers, planks and sleeper. Gasoline-engine-driven 1,250-watt portable generator furnishes power to two drills; duplicate generator supplies power to two electric hand-saws.

yard, as part of 15,700 sq.yd. of paving on 69th Road, crossing Flushing Meadow Park. Paving of the road was included in a $121,000 contract calling also for top-soiling and landscaping of 2 mi. of Grand Central Parkway Extension, which 69th Road crosses on a grade-separation bridge.

All lumber used in the corduroy base and curbs was Douglas fir. After the contract had been awarded, the engineers required that the corduroy base be constructed with full-size 2-in. lumber but permitted use of dressed lumber while shipment of rough lumber from the Pacific Coast was delayed by a strike.

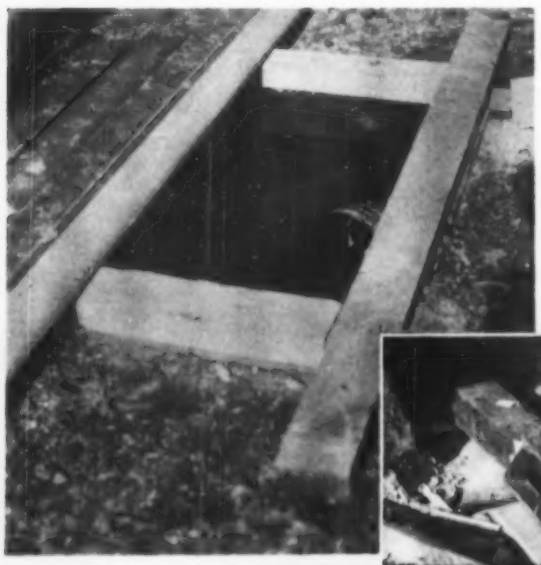


CODUROY BASE consisting of two layers of 2x12-in. planks supports stone and bituminous macadam pavement on cinder fill confined between bolted timber curbs.

DIRECTING OPERATIONS for Evelyn Construction Co. and for New York State Department of Public Works, respectively, BENJAMIN DOKTORICH (left), president of contracting firm, and J. W. DAVIS, engineer in charge, give instruction for deliveries of material.

ON TOP OF COMPACTED CINDERS contractor places 5-in. base course of crushed rock, keyed with sand scattered by hand from truck.

BROKEN STONE BASE COURSE (right) is keyed with sand worked into stone by combination of hand brooming and rolling with 10-ton roller. On top of this course contractor places 3-in. asphalt penetration macadam, followed by final 1-in. wearing surface of premixed asphalt macadam.



DROP INLET of creosoted timber collects roadway runoff and delivers it to asphalt-coated corrugated metal drainage pipe.

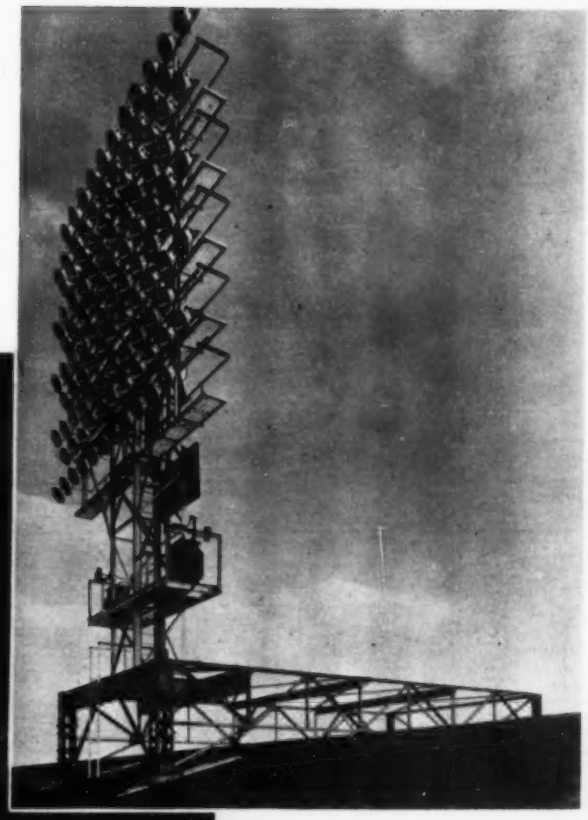
DROP-INLET CASTING (below) resting on timber base tops out drainage chamber.

WELDED STEEL GRATING completes drop inlet. Curb casting is adjustable to permit raising to grade.

JOB ODDITIES

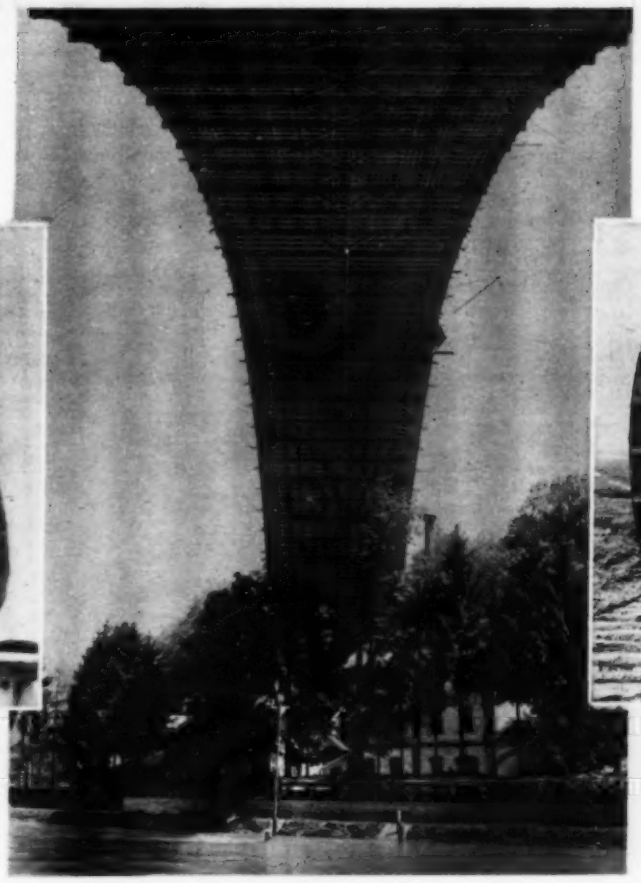
A MONTHLY PAGE OF

Unusual Features of Construction



NIGHT BASEBALL for American League gets its start at Shibe Park, Philadelphia Athletics' home field, illumination of which is here being tested in preparation for first game. Called best-lighted sports field in world, park has 2,000,000,000-beam-candlepower system comprising 780 Westinghouse floodlights of 1,500-watt capacity each, erected on eight steel towers with top lights 155 ft. above ground. Belmont Iron Works fabricated and erected towers, six of which **(insert, above)** are supported by steel platforms above grandstands.

INTRICATE GEOMETRICAL DESIGN (right) is presented by view from below of unusual timber arch centering of 450-ft. span, built by Locher & Cie, contractors of Zurich, to support concrete forms for Swiss federal railway bridge over Aare River at Berne. Other views of centering appear in "How They Did It" section of this issue.



SALVAGED DRILL STEEL, worn down in service until too short to be of further use, makes attractive andirons for Nate Corley, master mechanic at Lodestar Mine, Mojave, Calif.

GIANT REAR WHEELS 12 ft. in diameter support 20-ton steam roller compacting soft soil in dike around reservoir at Abberton, North Essex, England.

Now 33 Cle

Fleet of Cletracs and
rapers travel in steady
ntinuous procession
th big loads on every trip

tracs *on Pennsylvania's Super Highway*

First 21—next **25**—then **28**. Now—**33** Cletracs are at work on the country's largest earth moving job.

Hour after hour—day after day—week after week—month after month—these 33 powerful Cletracs are hauling and bulldozing mountains of earth, rock and shale into a roadway which when paved will become Pennsylvania's new super highway.

Time is at a premium—*penalties* follow if the job is delayed. With Cletrac's ability to move dirt faster and Cletrac's on-the-job service, contractors using Cletracs are keeping ahead of schedule.

THE CLEVELAND TRACTOR CO. • CLEVELAND, OHIO

Bulldozing big piles of earth and rocks takes power. Cletracs have it.

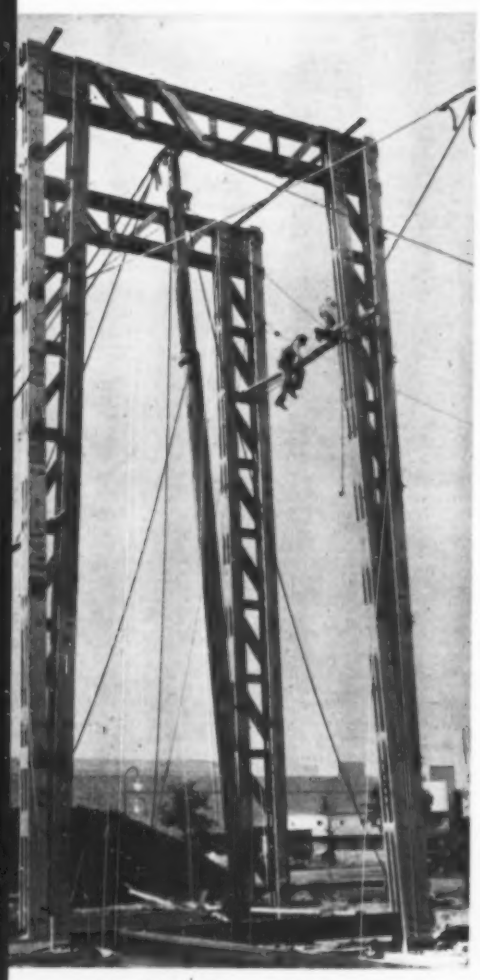
CLETRAC CRAWLER TRACTORS

14 to 95 HORSEPOWER • GASOLINE OR DIESEL

TIMBER ARCH CENTERING OF 450-FT. SPAN having rise of 100 ft. is assembled with aid of split-ring connectors to support forms for concreting Swiss federal railway bridge over Aare River at Berne. Centering erected by Locher & Cie., contractors, of Zurich, is 42 ft. wide and consists of twelve trusses 11 ft. high, assembled in lengths of 21 and 42 ft. Upper and lower chords are each made up of six 4x12-in. timbers. Centering is erected with aid of two 3-ton cableways, central wood tower and auxiliary scaffolds and cable anchorages at abutments. Concrete arch has hollow box-section 10 ft. high at crown and 15 ft. high at spring line, consisting of upper and lower slabs reinforced by four longitudinal ribs. Load of concrete on centering is 18 tons per linear foot at crown and 28 tons per foot at spring line.

PORTABLE PIPE THREADER proves convenience on job of building new 694x340-ft. aircraft factory building at Middle River, Md., for Glenn L. Martin Co. Device, powered by electric motor, is mounted on pair of wheels so that it can be moved easily and quickly about the site.

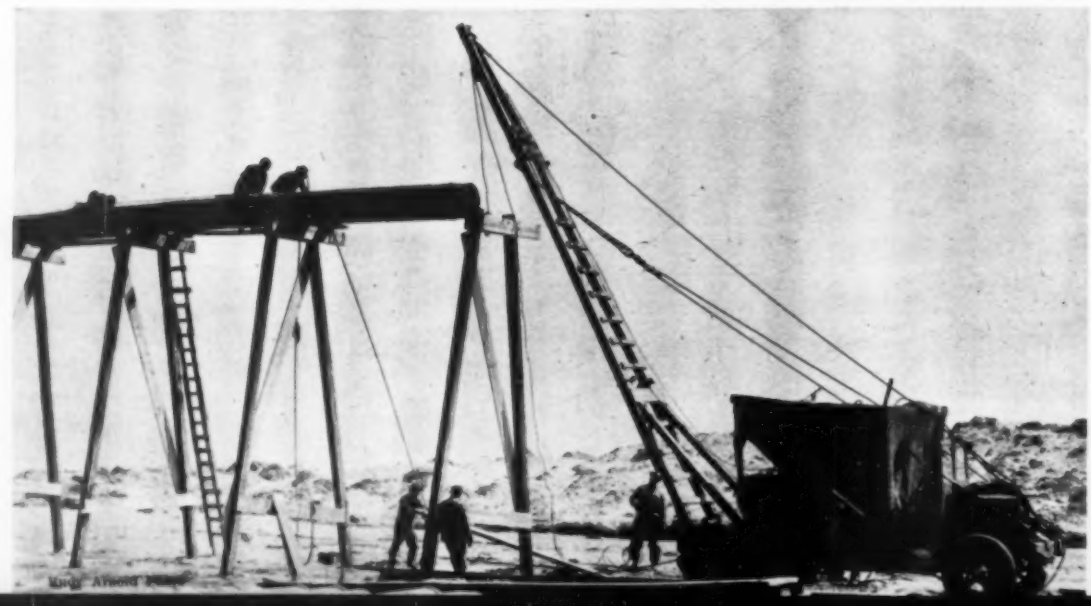
How They Did It... *Construction Details for Su*

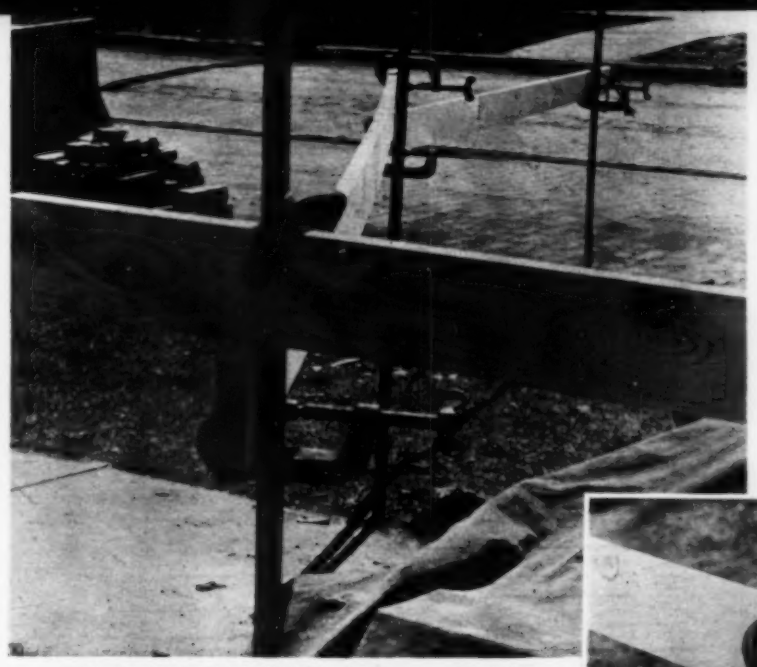


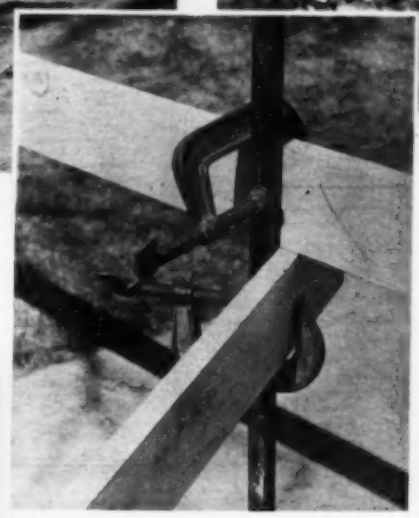
RIGID FRAMES of wood for 50-ft. high Brazil building at Golden Gate International Building, San Francisco, are fabricated with split-ring connectors at joints and flush type shear plates at foundation connections. Eight rigid frames in structure are assembled and erected by Summerbell Roof Structures of Northern California.

FOR CLEARING AWAY DEBRIS (in oval, right) following failure of bridge near Vicksburg, Miss., this double-drum winch mounted on rear end of 81-hp. Allis-Chalmers tractor proved a handy piece of mobile equipment. Front end of tractor is rigged with a bulldozer blade.

FOR SETTING DREDGE PIPE (below) to place fill on circumferential highway project near shore line of Jamaica Bay in Brooklyn, N. Y., Gahagan Construction Corp. used this wooden A-frame rig mounted on rear end of motor truck and powered by winch carried on truck body.



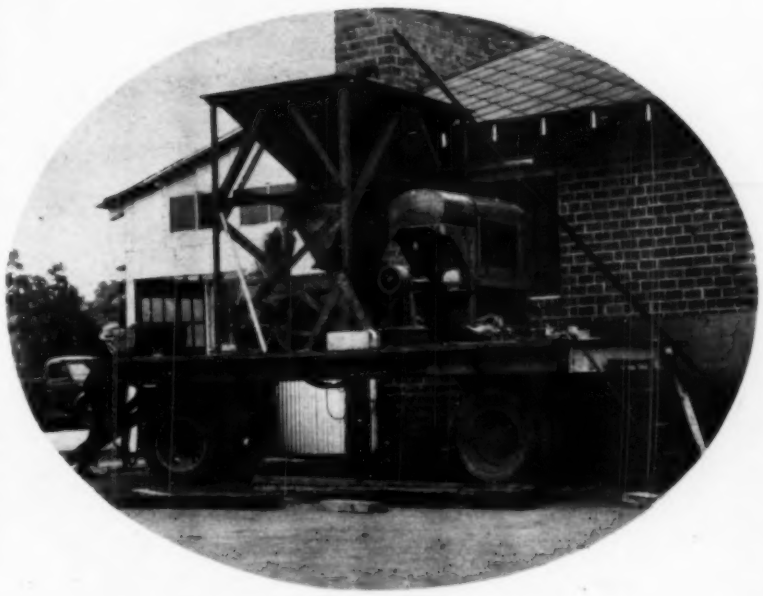




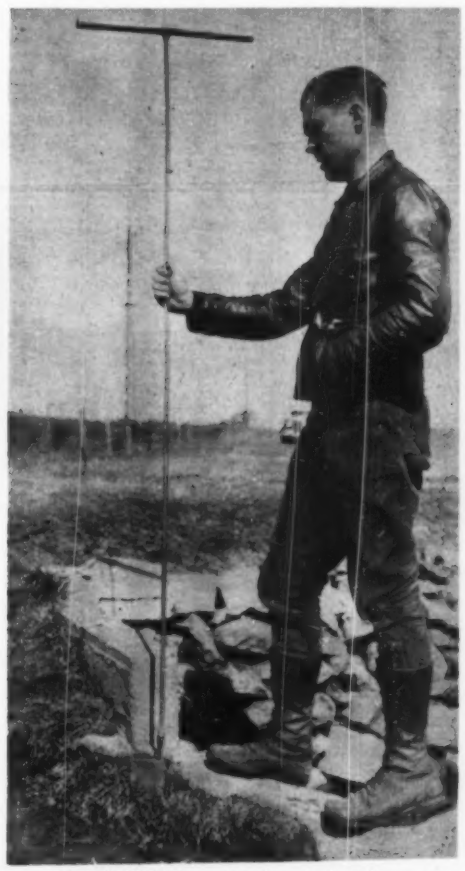
TEMPORARY BARRICADE (above and right) utilized by Lincoln, Neb., contractor consists of square iron stakes driven into ground to support 1x4-in. boards attached by C-clamps **(right).** Barricade is easy to assemble and remove for repeated use. — Photo from RICHARD W. HUFNAGLE, Lincoln, Neb.

NO DANGER FROM CARBON MONOXIDE FUMES is created by exhaust gases of motor trucks operating underground for removal of muck from Manhattan approach bore to Queens Midtown tunnel under East River, New York City. Powered by 4-cylinder Cummins diesel units, instead of gasoline engines, trucks give off exhaust gases so low in carbon monoxide content that New York State Department of Labor has approved their use for tunnel haulage. This makes it possible for Andrew Gull Corp., operating a fleet of fourteen trucks under haulage subcontract with Rosoff Bros., Inc., and Woodcrest Construction Co., to run trucks right up to tunnel face for direct loading by diesel powered shovel. Each truck hauls 6 cu.yd. of blasted rock, weighing about 14 tons. Ventilated by 15,000-cu.ft. per minute blowers, tunnel air, with trucks and shovel operating, showed carbon monoxide concentration of only 0.005 as compared with allowable maximum of 0.03.

...r Superintendents and Foremen

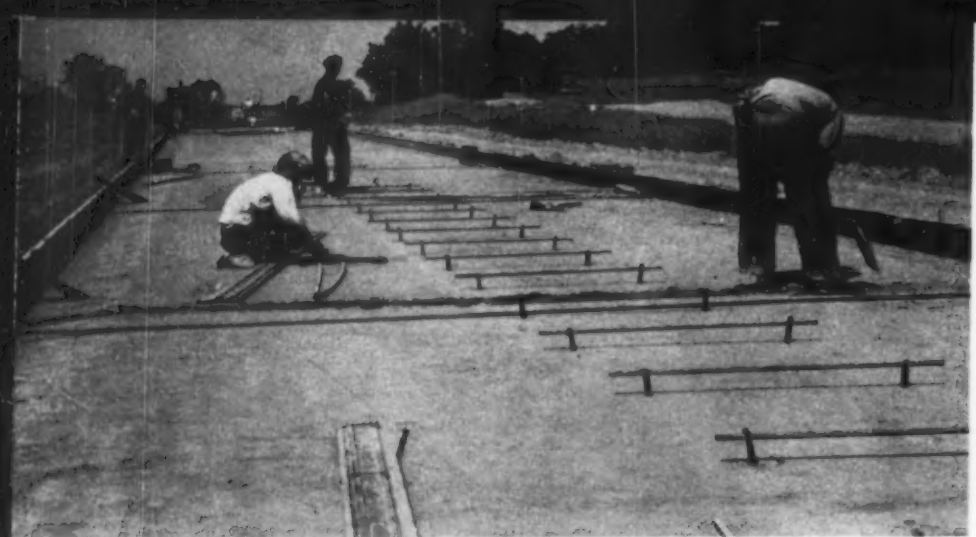


PORTABLE ASPHALT PLANT (in oval, right) for sand-asphalt cold-lay mixes, being built at Division 3 shop, Fayetteville, N. C., is first portable plant of North Carolina Highway Department. Unit includes 12-cu.ft. Hetherington-Berner pugmill (requiring about 23 hp. for operation) and International 45-hp. gasoline engine to drive mixer, asphalt pump and inclined bucket elevator (not yet installed) at rear. Bin has steep sides and wide opening to handle moist sand without rodding. Fifth-wheel circle and rubbing plate under riveted and welded trailer frame are designed for easy removal and replacement. G. A. Brinkley, division mechanic for Divisions 3 and 6, is in charge of building plant, and L. C. Hubbard, soils engineer, Division 3, is responsible for engineering design.



STEEL PROD used to locate lost lines of drain tile is designed with point larger than shank to prevent binding. — Photo from WILLIAM S. FOSTER, inspector, Iowa Highway Commission, Ames, Iowa.

DIESEL PULL SHOVEL (left) digs trench for water main to serve Pennsylvania R. R. coal docks and loading wharf. Marion 1-yd. shovel powered by Caterpillar engine excavates 500 lin.-ft. of ditch in 8 hr. on 2½ gal. of fuel oil for Ferguson & Edmondson Co., contractor, Pittsburgh, Pa.



TO INCREASE KNOWLEDGE of highway operations, department releases for publication series of twelve photographs (two of which are shown) illustrating steps in concrete pavement construction. Each step is fully described in simple language for information of public.

The Function of PUBLICITY in a Public Relations Program

By MARC G. WAGGENER
Director of Publicity, State Highway Commission, Indianapolis, Ind.

PUBLIC RELATIONS PROGRAMS are comparatively new phases of highway activity in many states. Yet there is no field which offers a greater return to the highway organization seeking popular understanding and approval for its construction, improvement and financing programs. Too frequently criticism of state highway programs has resulted from failure of highway officials to keep motorists and the public informed.

This article is concerned with the function of publicity in a well-balanced public relations program for state highway organizations, with the mechanics of preparing and disseminating news on highway activities and with the results that may be expected. For illustration the article refers to the publicity program developed by the State Highway Commission of Indiana, not that the program is perfect, but because it demonstrates what can be done and how to do it.

Gaining Editorial Acceptance — The cardinal principle underlying all successful public relations — obtaining the confidence of the public — is particularly important in publicity. Unless a highway organization possesses the confidence of newspaper editors in its accuracy, in the advisability of its program and in the results which it seeks to obtain, its publicity will be wasted. As a preliminary step in obtaining the confidence of the newspapers, an organization should place its publicity program in charge of a trained newspaper man, one who can see a story and who knows what to do with it.

In the preparation of publicity it is essential that stories be written from a newspaper viewpoint, that they be concise and accurate and that they reach the editor's desk in such form that they can be used with a minimum of effort on his part. Each article should carry a suggested heading which meets the average style of newspapers to be served, and the article must reach the newspaper in advance of the release date.

Handling a News Story — Let us trace the steps taken in getting a news story on a newspaper editor's desk. Recently the Indiana Highway Commission took bids and purchased a number of snow plows and graders to be used in snow and ice removal by the maintenance division. With this news as a basis, a story was written regarding preparations that the maintenance division was making to keep Indiana highways open during the winter. It cited the new equipment purchased, the total now available, the use of sand, cinders, calcium chloride and rock salt, and the plans of operation to be followed. The entire story was told in less than 400 words.

A stencil was cut for the story, and mimeographed copies were made and placed in the mail on Saturday. It is the department's practice to send out all mail stories on Saturday to make sure that the editors of Indiana's 400 newspapers will have the envelopes on their desks Monday morning. Thus they have time to prepare the Monday releases for use that day or, in the case of weekly papers, to get the type set well in advance of publication date.

Articles prepared for release through news agencies such as the Associated Press, United Press, and International News Service, have a release date marked on each of the carbon copies. Copies are handed simultaneously to all correspondents, no one agency being given any preference.

Briefly, that is the method of news distribution. What are the sources of these articles?

News Sources — The primary source of news is in the acts of the highway commission — approval of construction and maintenance programs, purchase of equipment, announcement of policies, award of contracts, hearings, petitions, addresses by members and other activities. Other sources include each division or phase of the highway organization.

Only rarely will officials and engineers of a highway organization realize the news value of the activities and operations carried on by their department. Being thoroughly familiar with every phase of their program, they assume that everyone else is equally well informed and are slow to suggest any phase of their activity as the subject of a news article. Awakening their interest in the news value of their operations is one of the tasks faced by the publicity man in the department.

Results — Of the results that may be obtained through the operation of a simple, inexpensive publicity program such as has been developed in Indiana, the primary product is educational. The motorists of Indiana, as a group, probably know more today about their state highway system, its operating costs, construction program and financial problem than at any time since the system was established 19 years ago. Having this knowledge, they understand the limitations placed upon extensions and improvement of the highway system, the importance of competent financing and the necessity of maintaining an adequate system of highways as a factor in the state's agricultural and industrial development.

No publicity program, no matter how carefully conceived and executed, will guarantee freedom from criticism. The better understanding of highway operations resulting from such a program, however, causes criticism to diminish and to assume a more constructive attitude which

NIGHT WORK on highway grading job proves of widespread interest and illustrates speed with which construction is pushed.

should be welcomed by highway officials. Without the public understanding and support that is a direct result of a legitimate publicity program no state can expect to maintain an adequate highway system.

Local Publicity for Contractors — In undertaking a piece of work which will cause inconvenience or temporary financial loss to local citizens, a contractor, as well as a state highway department, is faced with the problem of placating local residents by demonstrating the necessity for the improvement and of informing the public of the means which are being employed to complete the job as quickly and with as little inconvenience as possible. To get this story into the hands of the public requires the cooperation of the local press.

As contractors or project engineers rarely have the time or the training necessary to prepare news stories, they must leave this function entirely to the discretion of the local editor or reporter. A great deal can be done in winning the interest and good will of local newspaper men by inviting them to inspect the work and by giving them a frank statement of all the facts, both good and bad. Newspaper men, as a group, can be trusted to respect confidence scrupulously, and a contractor or project engineer never loses anything by stating his whole case, with the expressed wish that certain facts be held in confidence, if this reservation is absolutely necessary. Ordinarily a much better understanding with local citizens is arrived at by making a clean breast of the whole matter, with nothing omitted or reserved for later publication.

Certain subjects are reliable items of local news interest. They can be utilized to maintain a spirit of friendly interest in the town or rural community. Such items include the number of men employed on the job, the size of the weekly payroll which the job is pouring into the community, the purchase of materials locally and the figures on construction progress by the day, week, or month.

PHOTOGRAPHS OF FLOOD DAMAGE to highways educate public in need for repairs and protection of roads from future high water.

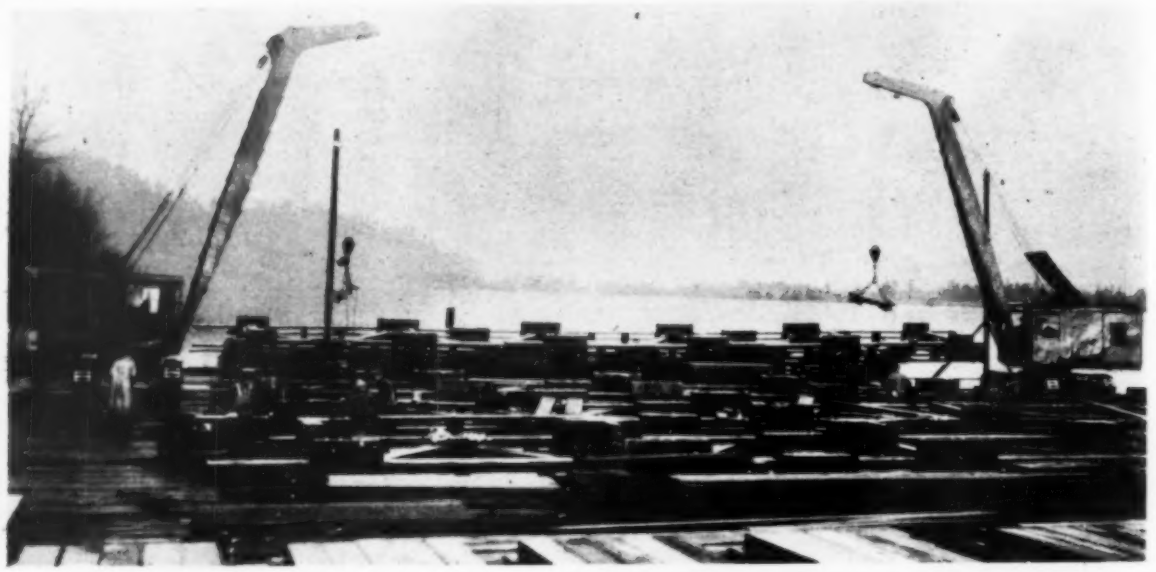
SCENIC HIGHWAY PICTURES (below) hold important place in publicity program, stimulating travel and at same time illustrating modern, well-kept condition of highway system.

Prefabricated Timber Bridge

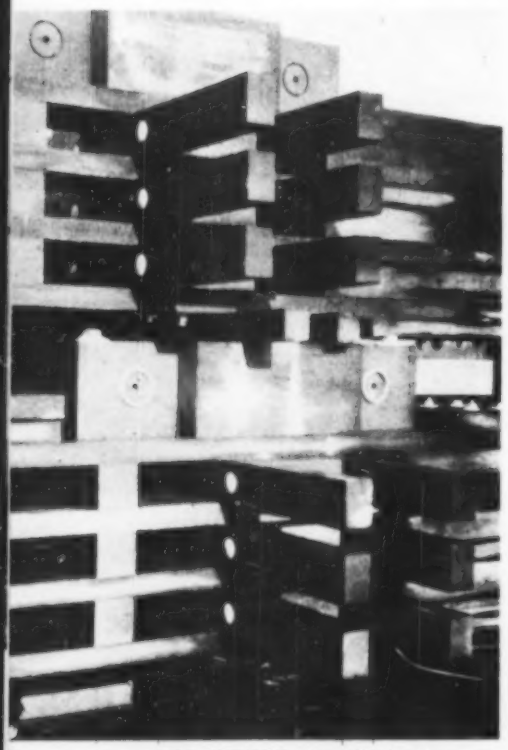
Replaces Columbia River Ferry

SPLIT-RING AND SHEAR-PLATE CONNECTORS simplify design and assembly of eighteen 96-ft. bridge trusses containing 180M b.-ft. of treated lumber.

ROUTED AND BORED prior to vacuum-pressure salt treatment, truss timbers take 4-in. split-ring connector (applied by workman around bolt) without injury to preservative salt treatment.

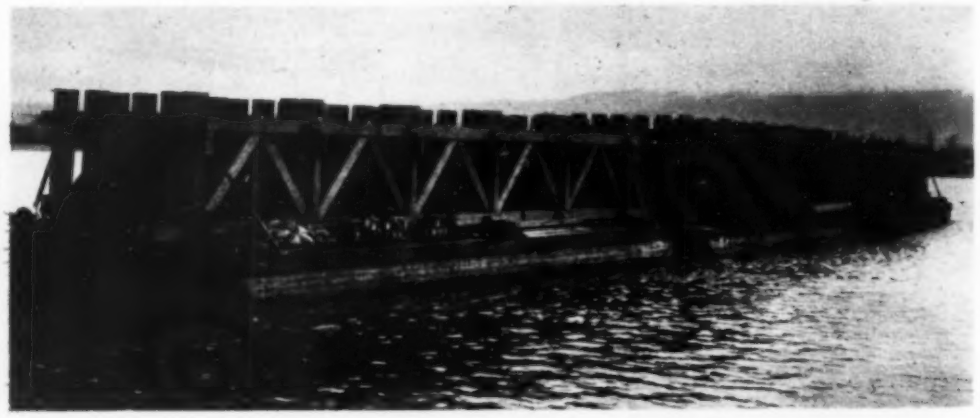


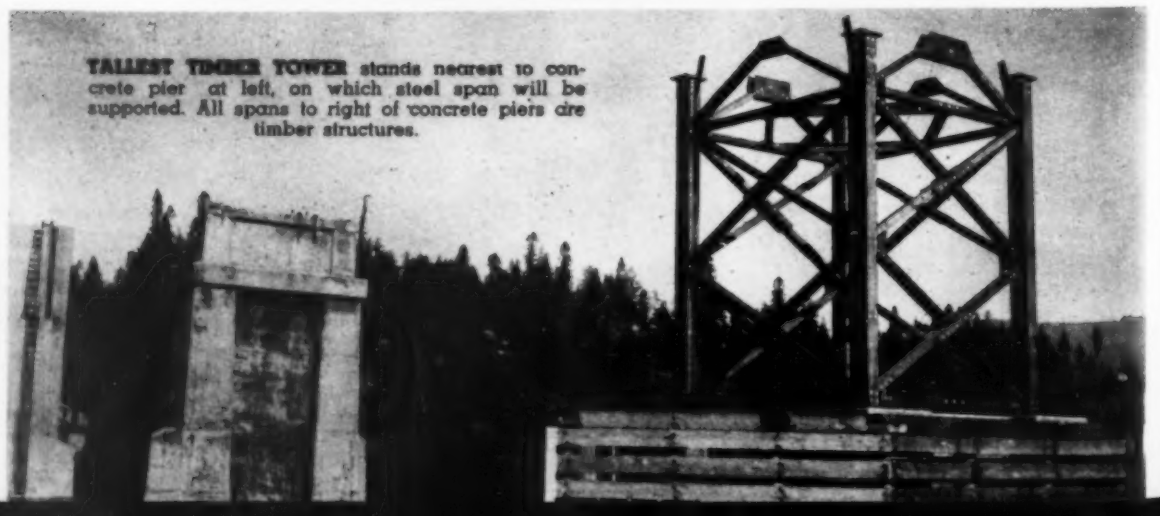
TWO CRANES stack 96-ft. trusses after assembly on lumber manufacturer's cargo wharf, awaiting completion of eighteen units for shipment to bridge site.



TOP DETAILS of two bridge trusses, stored flat on wharf before shipment. Routed circles and rings will be used in connecting to other bridge members after erection. Six 4x6-in. uprights projecting above top chord will anchor 12x24-in. floor beam on bridge.

THREE BARGES (right), loaded with eighteen 96-ft. trusses weighing 19 tons each, start trip from wharf to bridge erection site.

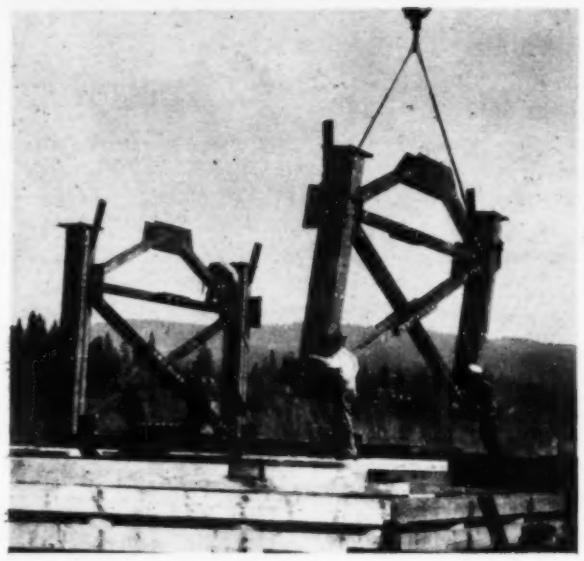




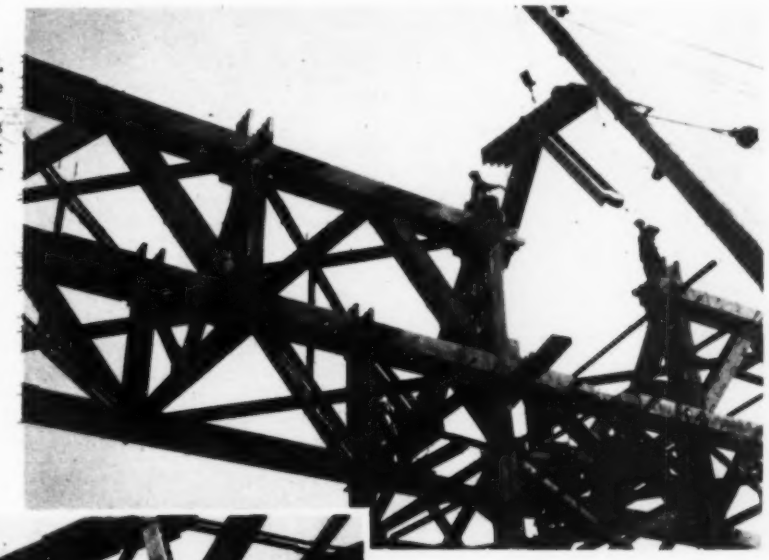
TALLEST TIMBER TOWER stands nearest to concrete pier at left, on which steel span will be supported. All spans to right of concrete piers are timber structures.

TIMBER TRUSS (left), handled by bridle sling on load line of floating derrick, swings into place on timber towers parallel with twin truss previously set in position.

FLOATING DERRICK erects prefabricated panel frames on top of timber tower. Four trusses are in position for two highest timber spans adjoining steel structure, which starts at concrete pier and extends in four spans to mainland at left.



ASSEMBLED BENTS of prefabricated, treated timber are erected by contractor on concrete pier base to form tower on which timber trusses will rest. Eight towers of varying height, framed with timber connectors, contain 23M b.-ft. of lumber.



FRAMED PANEL (right) to complete structure over timber tower is placed by derrick with aid of workmen.

PREFABRICATION AND ASSEMBLY of large timber trusses has facilitated erection on the Columbia River, in Washington, of a 2,400-ft. bridge connecting Puget Island with the mainland at Cathlamet, county seat of Wahkiakum County. The bridge, to be completed in August, takes 725 M b.-ft. of Wolmanized Douglas fir and costs $400,000.

Consisting of nine timber spans and four steel spans, the structure will connect Washington State Highway No. 12 at Cathlamet with Puget Island, replacing a ferry service that has served the 800 island inhabitants, whose livelihood is salmon fishing, gardening and dairy farming. Highway No. 12 runs from Longview-Kelso in Cowlitz County to Pacific Ocean beach resorts in Pacific County.

Contracts for the bridge were let in three units, the first for foundation piers, the second for four steel spans over the river channel, and the third for 500,000 ft. of Wolmanized lumber for an all-wood approach made up of seventeen timber trestle bents and nine wood truss spans of 96 ft. each. Trusses were made economically feasible by the use of Teco split-ring and shear-plate connectors in the joints. The third unit includes 1,200 lin.ft. of inclined approach rising from low-elevation diked land on the island. At the Cathlamet end no approach is necessary, as the high steel spans connect directly with the highway at that level.

Fabrication of eighteen frame trusses, each 12 ft. high, 96 ft. long

(Continued on page 106)

SERIES OF TIMBER TRUSS SPANS (below) connect inclined trestle-bent approach on island in Columbia River with steel structure in background crossing channel to highway on mainland.

TIMBER CROSS-BRACING (right) between top chords and bottom chords stiffens two trusses transversely.

CARRIER SCRAPERS

Move Material Under Varied Conditions On Vermont Road Job

MOVING GRAVEL from borrow pits under favorable operating conditions, tractor-scraper unit is able to produce output ranging up to 1,000 cu.yd. in 16-hr. day.

AFTER HEAVY RAIN, clay pocket is excavated by 12-yd. scraper drawn by two 95-hp. tractors. Note steel tow rope leading from second tractor to first. Lead tractor is detached at end of pull through wet material.

WET CLAY is wasted on dump by tractor-operated cable-controlled scraper.

TRACTOR-DRAWN CARRIER SCRAPERS proved versatile earthmovers under a variety of conditions on common excavation and borrow for the Lane Construction Corp., Meriden, Conn., contractor on a 5.08-mi. improvement of Vermont Route 15 in the towns of Underhill and Westford for the Vermont Department of Highways. In good material and under favorable conditions, each 12-yd. scraper drawn by a 95-hp. diesel tractor could move 1,000 cu.yd. in a 16-hr. day. When starting cuts in farm land to widen the existing road, however, the scrapers encountered unexpectedly stiff resistance in handling dry stone walls laid up by generations of thrifty New England farmers. These walls provided sufficient obstruction to reduce scraper output to one-third of that attained under the most favorable conditions.

Extent of Job — Improving the longitudinal profile and widening the cross-section of the existing road to carry a 20-ft. mixed-in-place surface are the primary objectives of the present project, which follows the old location except for minor changes, totaling less than ¾ mi. The quantities involved in grading, drainage and surfacing are indicated by the table on the opposite page. In addition, the contract calls for two rolled girder bridges of 54-ft. and 64-ft. span at stream crossings.

IN CHARGE OF CONSTRUCTION (left to right): F. L. BOWEN, superintendent, Lane Construction Corp.; F. C. COATES, construction engineer, Vermont Department of Highways, and R. H. ARNOLD, resident engineer.

On this section of Route 15, the road traverses foothills of the Green Mountains in an east-west direction, cutting through a gap in the range. At many places the highway hugs the shoulders of the hills, and the contractor removed 8,700 cu.yd. of ledge and 35,000 cu.yd. of common excavation from sidehill cuts at these locations. Gully crossings called for construction of nine box culverts, 3x3 ft. to 7x7 ft. in size. To build up the grade at the gullies and other low spots and to replace excavated clay pockets, the scraper outfits moved 52,000 cu.yd. of additional material, mostly gravel, from borrow pits. Where possible, some fills were built with 1 on 4 slopes to eliminate need for guard rail. Shoulders on the two sides of the traveled road are made 6 ft. wide on fills and 4 ft. wide in cuts.

Work on the project started in June, and the construction schedule was drawn up to provide for completion of grading, structures and gravel sub-base last fall, to be followed by mixed-in-place tar-gravel surface in the spring. For gravel sub-base, power shovels dug 45,000 cu.yd. of material from borrow pits, and this material was spread to minimum depths of 18 in. in cut and 12 in. on fill. Specifications required the contractor to maintain traffic over the project in a satisfactory manner. While heavy grading was in progress and drainage structures were being built, the Department of Highways permitted the contractor to carry traffic over detour roads marked and maintained in good condition.

Scraper Operations — To move a total of 130,000 cu.yd. of common excavation and borrow material, the contractor equipped the job with five LeTourneau 12-yd. scrapers drawn by Caterpillar 95-hp. diesel tractors. Ordinarily four of these units operated in combination on cut or fill operations. As an example of what a fleet of four tractor-scrapers could do under favorable conditions, it built a 5,000-cu.yd. fill on an approach to one of the bridges in 1½ days, hauling the material an average distance of about 500 ft. from a gravel borrow pit. The scrapers operated two 8-hr. shifts per day.

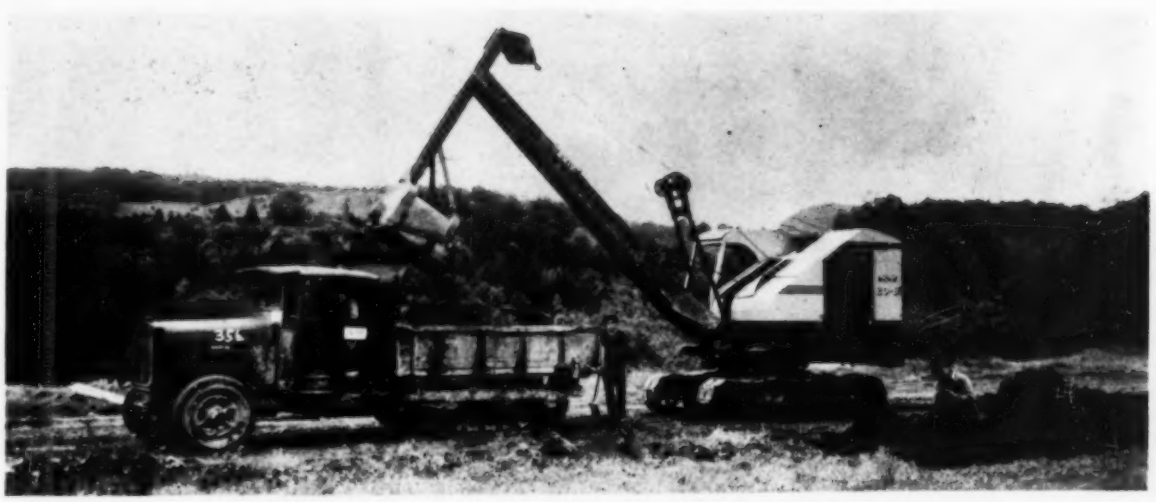
Under less favorable conditions, the output of the scrapers was reduced. Accompanying photographs show

(Continued on page 106)

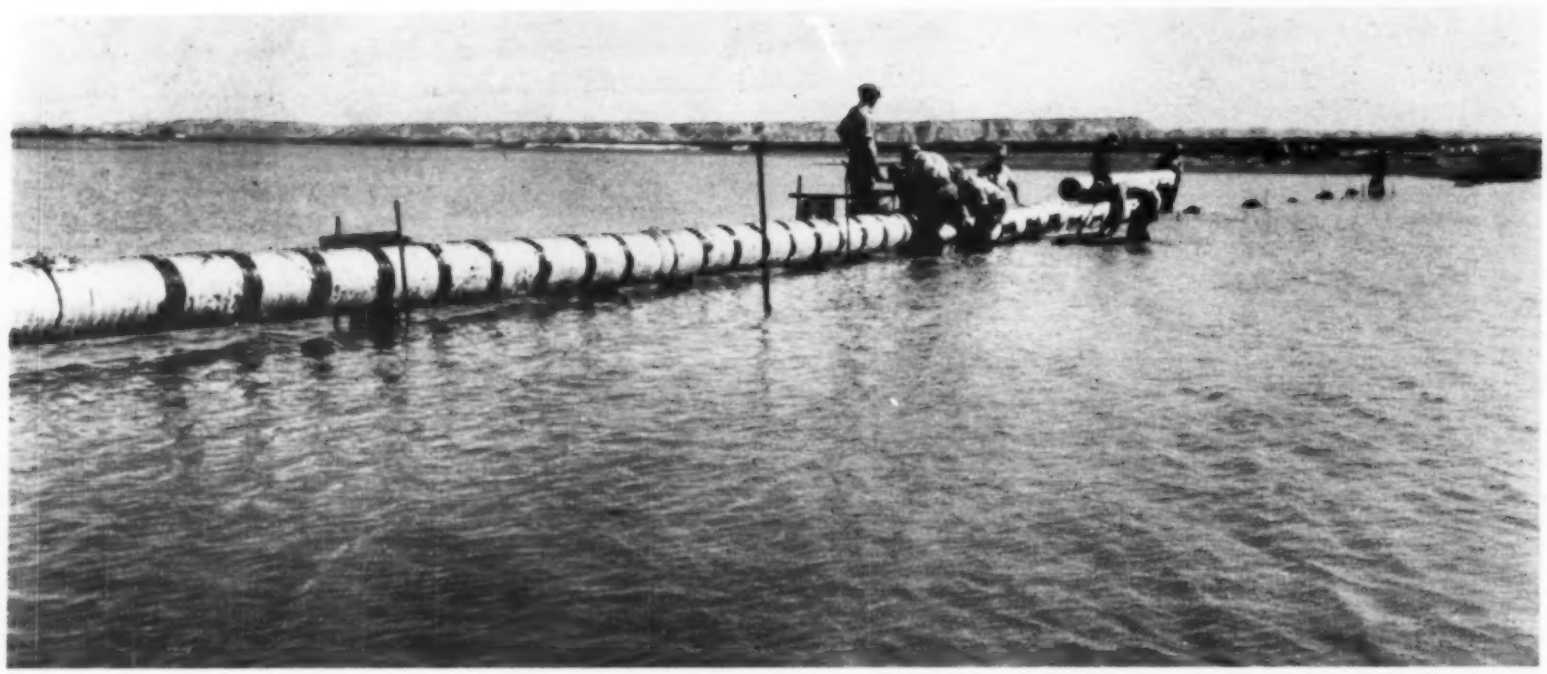
Contract Quantities and Prices for Grading, Drainage, Surfacing

Item	Unit	Quantity	Unit Price	Amount
Solid rock excavation	cu.yd.	8,700	0.35	$3,045.00
Common excavation incl. borrow	cu.yd.	96,000	0.35	33,600.00
Trench excavation of earth	cu.yd.	4,115	0.80	3,292.00
Trench excavation of rock	cu.yd.	1,000	3.00	3,000.00
Channel excavation	cu.yd.	120	0.50	60.00
Structure excavation	cu.yd.	300	5.00	1,500.00
Patrol maintenance	days	25	15.00	375.00
Sub-base of gravel	cu.yd.	45,300	0.42	19,026.00
Crushed gravel mixed-in place surface with refined tar	cu.yd.	4,200	3.90	16,380.00
Refined tar	gal.	92,535	0.12	11,104.20
Concrete Class A	cu.yd.	370	18.00	6,660.00
Reinforcing steel	lb.	37,700	0.045	1,696.50
Cement rubble masonry	cu.yd.	182	6.00	1,092.00
12-in. reinforced-concrete pipe	lin.ft.	468	1.20	561.60
18-in. reinforced-concrete pipe	lin.ft.	952	2.10	1,999.20
24-in. reinforced-concrete pipe	lin.ft.	100	3.25	325.00
30-in. reinforced-concrete pipe	lin.ft.	124	4.50	558.00
15-in. corr. galv. metal pipe, asphalt-coated	lin.ft.	70	1.50	105.00
18-in. corr. galv. metal pipe, asphalt-coated	lin.ft.	1,222	1.75	2,138.50
24-in. corr. galv. metal pipe, asphalt-coated	lin.ft.	188	3.00	564.00
30-in. corr. galv. metal pipe, asphalt-coated	lin.ft.	64	4.00	256.00
36-in. corr. galv. metal pipe, asphalt-coated	lin.ft.	102	5.00	510.00
Relaying pipe culverts	lin.ft.	300	0.50	150.00
Stone fill	cu.yd.	200	1.50	300.00
Standard underdrain with 6-in. perf. corr. galv. metal pipe, asphalt-coated	lin.ft.	4,500	0.80	3,600.00
Wood guard rail	lin.ft.	888	0.60	532.80
Cable guard rail	lin.ft.	12,028	0.40	4,811.20
Anchors for cable guard rail	each	74	9.00	666.00
Guide posts	each	62	2.50	155.00
Erection of State or F.A. markers	each	2	15.00	30.00
Boundary markers	each	200	4.00	800.00
Drop inlet grates	each	4	15.00	60.00
Drilling and blasting of solid rock in ditches	lin.ft.	700	0.50	350.00
Cutting and removing trees	each	154	8.00	1,232.00
			TOTAL	120,535.00
			Total amount for 54-ft. bridge	5,378.19
			Total amount for 64-ft. bridge	6,528.48
			GRAND TOTAL FOR CONTRACT	$132,441.67

TRACTOR-BULLDOZER working on cut slope pushes spoil down to ditch line for removal by scrapers.



CONVERTIBLE UTILITY EXCAVATOR (right) equipped as backhoe digs ditch and loads spoil into track-type traction truck powered by diesel engine.



ANCHORAGE OF NEW PIPE to old sewer, to prevent flotation when level of drained lake rose to 7 ft. height, was done with ¾-in. U-bolts and strap-iron clamps. Standard corrugated couplers are used to join 20-ft. pipe sections.

LEAKING SEWER

REPLACED BY LINE OF METAL PIPE

Emergency Crossing of Lake Supplying Beet Sugar Plant Completed in Three Days

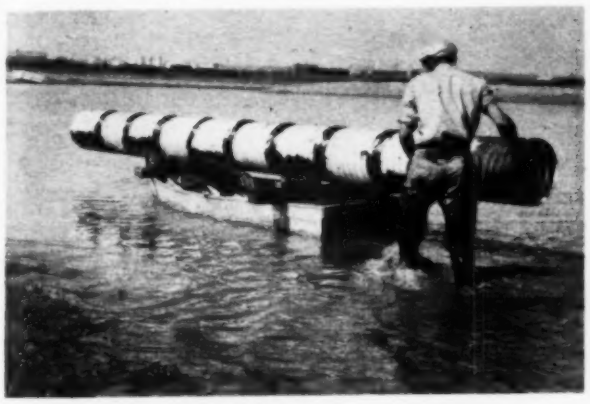
TO MAKE JOINTS WATERPROOF hot asphalt paint was swabbed on all seams of new corrugated pipe line.

FLEXIBILITY OF CORRUGATED PIPE enables it to negotiate bends in sewer alignment.

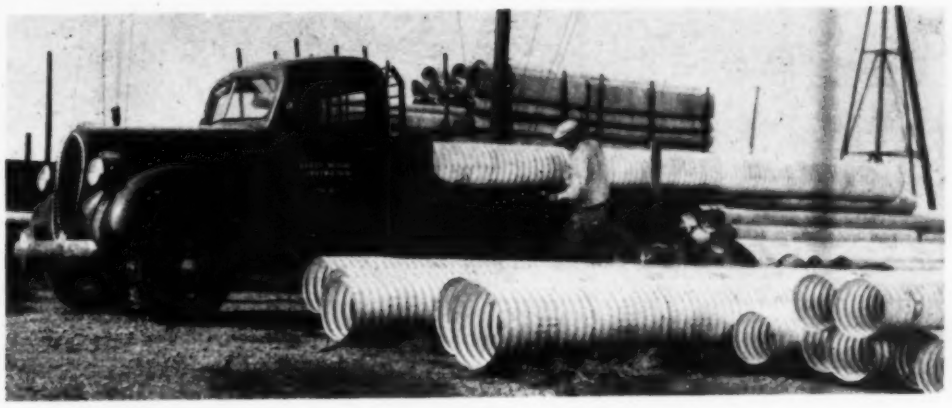
BROKEN SECTIONS (right) and leaking joints of old tile pipe sewer allow inrush of water which drained lake supplying beet sugar plant.

WHEN IT WAS DISCOVERED that a leaky 18-in. tile-pipe sewer 700 ft. long was draining away water from a lake in the bottom of which it had been laid years ago, the Holly Sugar Corp., of Sidney, Mont., decided to replace the line with a watertight conduit of corrugated metal pipe. The supply of lake water which was being depleted by infiltration through joints and cracks in the old sewer, was urgently needed in the company's operations of producing beet sugar.

After the lake had been drained to knee depth a new corrugated metal pipe line in sections 20 ft. long was anchored to the buried tile pipe sewer by ¾-in. U-bolts and strap-iron clamps in order to prevent flotation of the new line when empty and after water in the lake should resume its normal level and submerge the new pipe sewer.



FLOATING OF 20-FT. SECTIONS of pipe to point of use was done with aid of rowboat and wood blocking resting on gunwales.

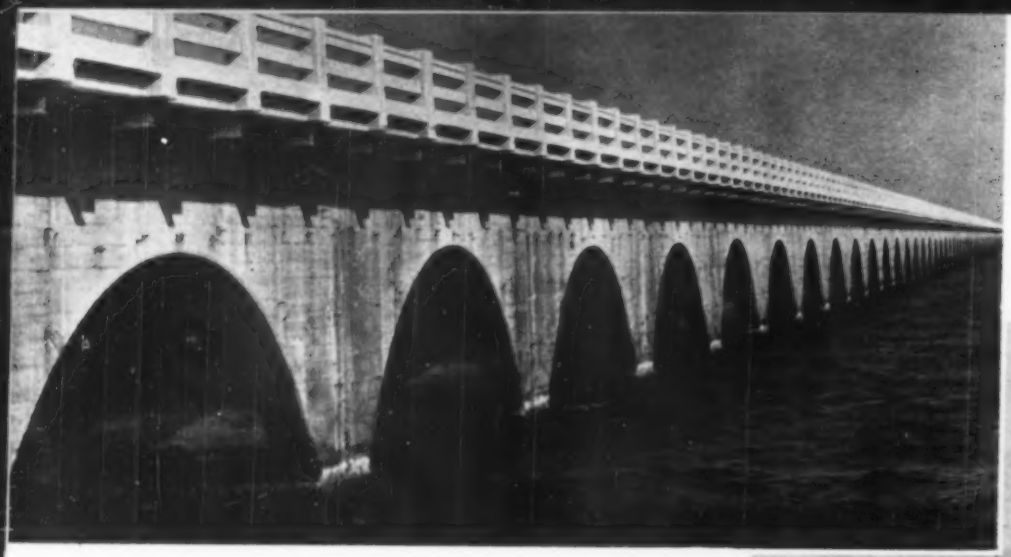


DELIVERY OF PIPE in 20-ft. lengths was made by motor truck from nearby plant of Montana Culvert & Pipe Co.

The job was an emergency one and under the superintendence of F. B. Lauster, of the Holly organization, was rushed through in a little more than three days' time. From the nearby plant of the Montana Culvert & Pipe Co., at Sidney, the pipe, made up in 20-ft. sections, was hauled by truck to the job where hot asphalt paint was applied to all joints to make them watertight. The sections then were loaded on to a rowboat and floated out to the point of use in the new sewer line where they were joined by standard corrugated couplers.

The installation began at the west shore of the lake and to this point all pipe and other materials had to be floated across the lake from the east bank. As indicated in some of the accompanying illustrations the line of corrugated metal pipe has sufficient flexibility to accommodate moderate vertical and horizontal bends in its alignment.

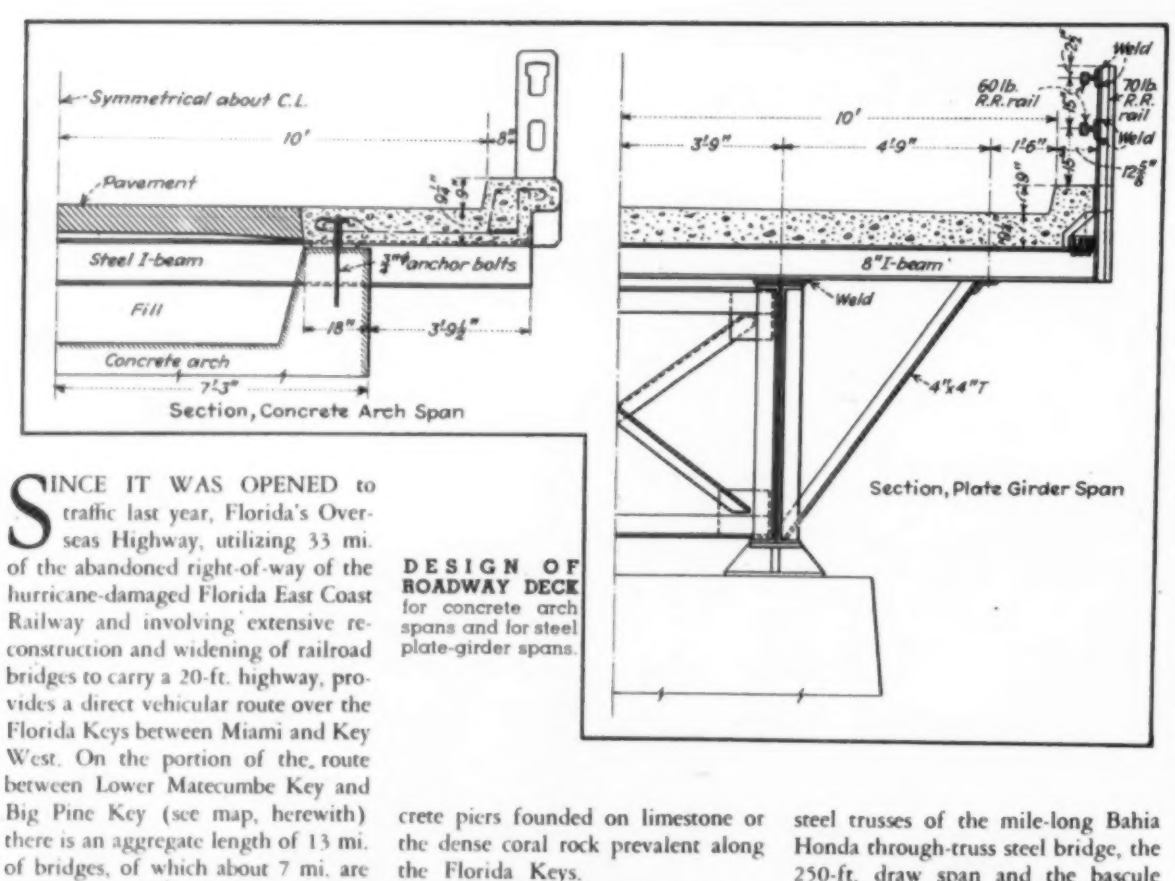
MANHOLE CONNECTION with new corrugated metal sewer line is made near lake shore and trench is backfilled by clamshell bucket on crawler crane.



WIDENING OF RAILROAD BRIDGES of two types **(left and below)** to carry 20-ft. highway was done by transverse I-beams applied to concrete arch spans (left) and to steel deck plate-girder spans (right).

Florida Railroad Bridges Revamped to Carry

OVERSEAS HIGHWAY



DESIGN OF ROADWAY DECK for concrete arch spans and for steel plate-girder spans.

SINCE IT WAS OPENED to traffic last year, Florida's Overseas Highway, utilizing 33 mi. of the abandoned right-of-way of the hurricane-damaged Florida East Coast Railway and involving extensive reconstruction and widening of railroad bridges to carry a 20-ft. highway, provides a direct vehicular route over the Florida Keys between Miami and Key West. On the portion of the route between Lower Matecumbe Key and Big Pine Key (see map, herewith) there is an aggregate length of 13 mi. of bridges, of which about 7 mi. are concrete arch spans, 5 mi. steel deck plate-girder spans and 1 mi. steel through-truss spans. In addition, there are two movable spans, a 120-ft. steel deck-girder bascule and a 250-ft. steel through-truss swing span. All of these railway bridge structures were built between 1904 and 1913, with concrete piers founded on limestone or the dense coral rock prevalent along the Florida Keys.

Three problems were involved in widening the existing railroad bridges to carry a 20-ft. highway: The first was to place a deck of sufficient width on the concrete arches; the second was to widen the steel plate-girder spans; the third was to carry the 20-ft. highway across the narrow steel trusses of the mile-long Bahia Honda through-truss steel bridge, the 250-ft. draw span and the bascule span.

Highway Deck on Arch Spans — Comparatively simple design was followed in constructing a deck on the old solid masonry arch spans, as shown in an accompanying drawing. Spaced 8 ft. 6 in. on centers, 12-in. 40-lb. I-Beams were set crosswise of the structure in notches cut in the spandrel walls to carry the deck for the 20-ft. roadway. The notches were then filled with concrete to anchor the steel beams in position. Forms for the two sections of concrete deck were next set on the steel beams and the deck sections poured. The space between the two sections of the concrete deck was then backfilled and surfaced with bituminous paving flush with the surface of the concrete to provide the 20-ft. roadway.

Highway Deck on Steel Girder Spans — After the ties and rails had been stripped from the steel girder spans, the tops of the girders were thoroughly cleaned and painted. Spaced from 9 ft. 2 in. to 10 ft. on centers, depending on the spans of the main girders, 8-in. steel I-beams were set crosswise on the girders to which they were electrically welded. (See accompanying drawing.) A knee-brace, electrically welded to a flange of the main girder and to the lower flange of each 8-in. I-beam served as a stiffener. All structural connections were welded, no rivets being used on this part of the job. With the steel cross beams in place forms were set and the concrete deck of the structure poured.

Widening of Draw-Span — The 250-ft. draw span had a horizontal clearance of 14 ft. between trusses, which had to be increased to 22 ft. This was done by cutting all floor and top bracing members and then moving the trusses on each side out

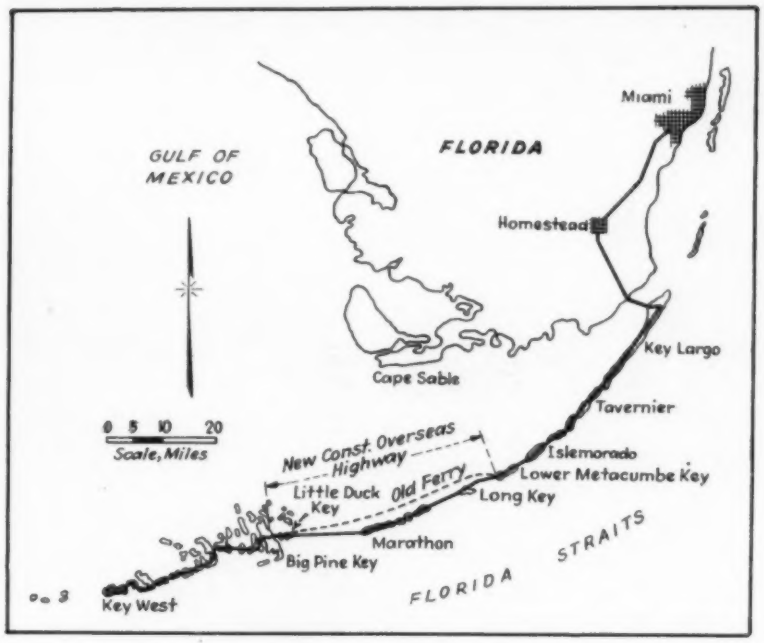
4 ft., where they were spliced by electric welding.

Deck on Top of Through Steel Beams — After careful estimates had been made on various methods of obtaining the necessary deck width on the mile-long structure of through-truss steel spans, the decision was made to build inclined approaches at both ends of this structure and place the highway deck on top of the trusses. Widening of the spans of this bridge, as was done on the 250-ft. draw span, would have been feasible, but sufficient funds were not available to cover the increased cost.

Reconstruction of 7-Mi. Bridge — Methods used in placing the deck on the 7-mi. bridge between Knights Key and Little Duck Key illustrate the principal problems involved and how they were solved. This long structure embraced two types of construction. For 6,800 ft. at the east end, where deeper water was encountered, the original designers used 80-ft. span steel girders carried by concrete piers. For a short distance across a small island the spans were reduced to 60 ft. Beyond this island is another stretch of 13,690 ft. of 80-ft. girder spans.

Beyond the steel construction is 9,034 ft. of 35-ft. masonry arch construction extending to the west end of the 7-mi. structure.

For various controlling reasons, operations were conducted from both ends of the project only. The two types of decking were set up as separate projects by S. J. Groves & Sons Co., as contractors for the rebuilding of the entire 7-mi. structure, excepting the 250-ft. draw span.



LOCATION MAP, showing portion of abandoned Florida East Coast Railway route converted into Overseas Highway.

THE ARTICLE WHICH FOLLOWS — by B. Benson, assistant superintendent for the S. J. Groves & Sons Co., contractor, of Minneapolis, Minn., — describes in detail working conditions and methods of widening and reconstructing concrete arch type of railroad bridge on Florida's Overseas Highway. — EDITOR.

How Contractor Built Overseas Highway On Concrete Arch Railroad Bridges

DISCUSSION OF UNUSUAL WORKING CONDITIONS AND FIELD METHODS ON FLORIDA KEYS PROJECT

By B. BENSON

Assistant Superintendent, The S. J. Groves & Sons Co., Minneapolis, Minn.

AMONG MANY UNUSUAL FEATURES encountered in constructing the Overseas Highway on the Florida Keys were the inaccessibility of the work, the length of some of the bridges over open water, possibility of hurricanes, lack of a fresh water supply, class of labor available and the transportation problem. The S. J. Groves & Sons Co., of Minneapolis, Minn., were contractors on more than 8 mi. of the bridge work involved, having three different contracts aggregating more than $1,250,000. This work consisted of widening the substructure and placing a concrete deck on two different types of railroad viaduct. About 5 mi. of this viaduct was of 60- and 80-ft. steel girder spans on concrete piers and 3½ mi. of concrete arch type with earth fill between the spandrel walls. The longest bridge in the Groves contract was 7 mi., being a combination of the two types. These notes deal chiefly with the work on the concrete arch type, which was all included in a separate contract and was handled as an independent unit.

Construction Camp on Barge — Camp was set up at Duck Key at the south end of the 7-mi. bridge, as shown on the location map. The only access to this point was by boat, as the railroad viaducts were impracticable for other than foot travel. The central unit of the camp was on a large house-barge anchored several hundred feet offshore and connected to the shore by a plank walkway. The barge was permitted to fill until it rested on bottom and at one end was a small float for tying up small boats and handling camp supplies. On the house-barge was the office, kitchen and dining rooms, and accommodations for about 60 men. As the work progressed and more men were needed, additional quarters were built on shore.

SEAGOING HIGHWAY along Florida Keys is protected by guard rails of old railroad rails welded to vertical posts.

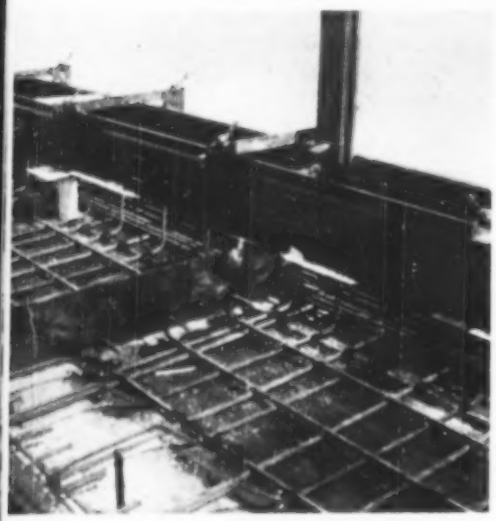
Supplies and fresh water were brought in direct to the camp by a small freight boat operated by a Key West concern to serve the contractors working at different points on the keys. All roofs were guttered into storage tanks to catch as much rainwater as possible.

Hurricane Hazard — The contractors had to face the possibility of a hurricane striking while their work was in progress and be prepared to take care of their equipment and evacuate their entire crews at a few hours' notice. All buildings were

I-BEAMS TO CARRY 20-FT. ROADWAY were set transversely across existing tops of existing railroad bridges by truck-crane.

P. H. HUNTINGTON, superintendent for S. J. Groves Co. on Florida Overseas Highway project.

IN NOTCHES IN SPANDREL WALLS of concrete arch bridge steel I-beams are set and concreted to carry widened roadway.



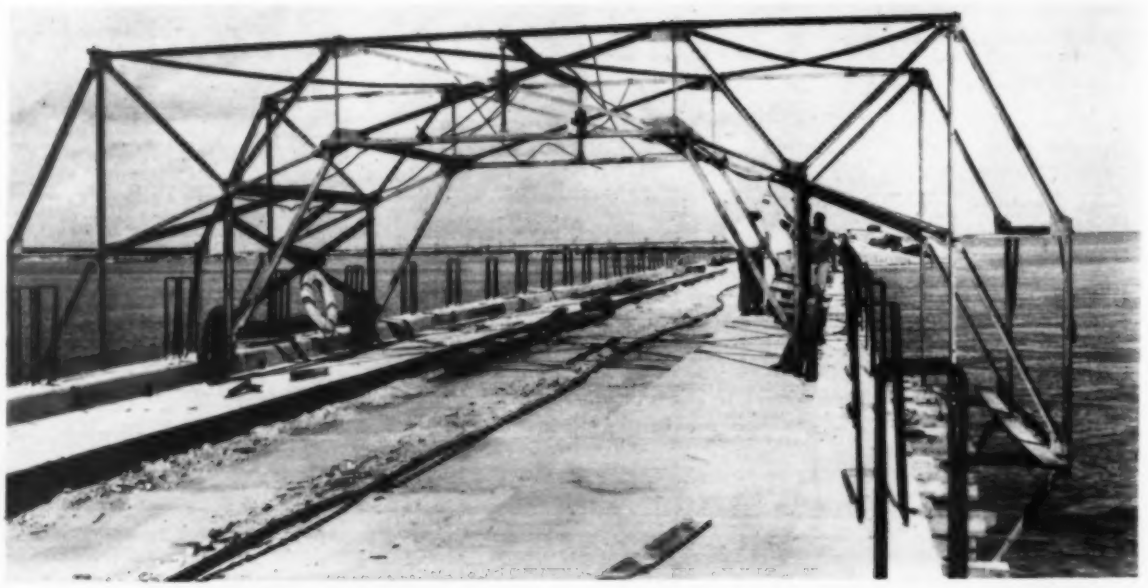
STEEL FORMS AND REINFORCEMENT are set, ready to receive concrete for widening slabs along each side of bridge.

WOODEN BOTTOM FORMS (right) for lateral widening strips of concrete are set flush under top flanges of I-beams projecting out from sides of old bridge.

well braced inside and cables run over the roofs and anchored to deadmen. Equipment on the bridge that could not be readily moved was provided with special cables and rods for anchoring into place. Sufficient tugs were always on hand to move all floating equipment into a sheltered harbor on short notice.

Several meetings were held by all the contractors engaged on the Overseas Highway and a program worked out whereby, by mutual assistance, the entire working forces of 700 or 800 men could be moved off the keys in a very short time. In addition, the U. S. Weather Bureau gave

(Continued on page 96)



STEEL FRAME TRAVELER, riding on rubber wheels, and offering no obstruction to traffic along bridge roadway, carries overhanging platforms on each side for setting forms for concreting.

CRAMPED QUARTERS FOR CONCRETING added to difficulties of casting lateral widening slabs on narrow bridge deck. Batch-truck (left) delivers charge to 27 E paving mixer (right) with finishing crew, in foreground, ready to screed surfaces of slabs.

Present and Accounted For

A Page of PERSONALITIES

Engineer-Collaborators on Pennsylvania Turnpike

$35,000,000 LOAN by Reconstruction Finance Corp. provides major financing for Pennsylvania's 161-mi. express highway, on which Col. F. E. LAMPHERE, inspecting engineer, represents RFC interests.

CONSULTANT on all-weather trans-mountain toll highway is Maj. H. H. ALLEN, of J. E. Greiner Co., Baltimore, Md., consulting engineers to Pennsylvania Turnpike Commission.

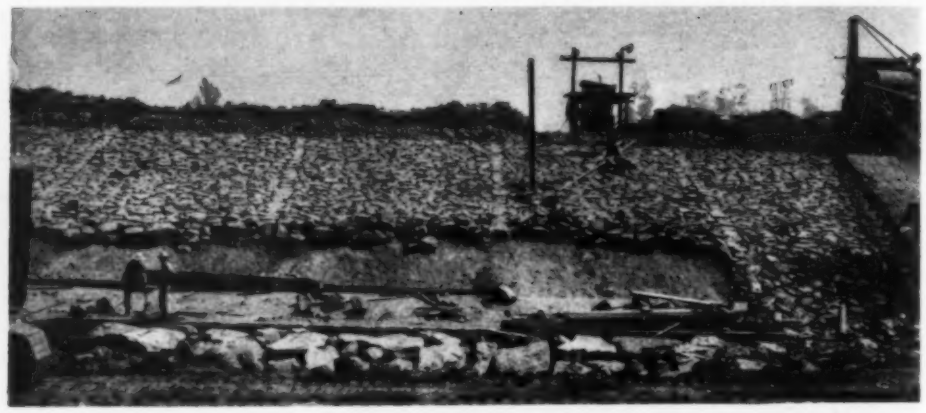
$60,000,000 TOLL HIGHWAY receives grant up to maximum of $26,100,000 from PWA, represented **(right)** by: (left to right, front row) JAMES F. MURPHY, project engineer; HAROLD C. LIGHTFOOT, assistant project engineer; (back row) WILLIAM T. STAATS, formerly traveling engineer (recently appointed assistant to chairman, Pennsylvania Turnpike Commission); and ZIBA B. PHELPS, Jr., acting chief of land acquisition section.

ASSUMING DUTIES of assistant commissioner, U. S. Bureau of Reclamation, HARRY W. BASHORE on June 5 moves his site of operations to Washington, D. C., after completing Alcova and Seminoe dams of Kendrick project, Wyoming.

APPOINTED COMMISSIONER (right) of canals and waterways after 12 years as Syracuse district engineer of New York State Department of Public Works, GUY W. PINCK takes up new responsibilities. He has been in state service since 1910.

CHIEF ENGINEER of Metropolitan District Water Supply Commission, Boston, Mass., is KARL R. KENNISON, who recently succeeded the late Frank E. Winsor following previous service as designing engineer and assistant chief engineer. Project now under his direction embraces outlay of $72,000,000 for extending sources of supply.

ROLLING BOOM on traveling mixer delivers mortar by bucket to all parts of slope. Batch truck on bank charges mixer skip with sand, cement being added from sacks stored alongside in advance.



BANK PAVING on tangent consists of 18 in. of rock grouted with mortar. Men in left foreground are standing on concrete toe slab at bottom of slope, capping line of interlocking steel sheetpiling. Partially visible at right are paving mixer and crew working on grouting.

Paved Banks Line Channel

For Los Angeles River Floods

U. S. ARMY ENGINEERS are converting the Los Angeles River channel into a speedway for flood waters. On curves the banks are concrete paved; elsewhere the slopes are protected with 18 in. of rock, grouted with 1 to 3 mortar. At the toe of each slope is a continuous block of concrete capping a line of interlocking steel sheetpiling driven perhaps 20 ft. below the river bed. Accompanying phtographs, taken between Verdugo Wash and Fletcher Drive bridge, indicate details of bank paving and channel stabilization.

GROUTING CREW [illegible] over rock after mixer with hose [illegible] ground has soaked [illegible].

ROCK is placed by men and machines for grouting. In foreground is 6-in. rubber hose used instead of boom and bucket to deliver grout from mixer.

FROM DISCHARGE END (right) of rubber hose, grout spreads over rock. Workmen assist spreading with shovels and brooms.

"CHANNEL STABILIZERS" about ¼ mi. apart are designed to localize damage and return river to channel if flood should ever break banks. Each structure has line of interlocking sheetpiles driven squarely across river bed, with trench on downstream side filled with large rock. Sheetpile wall extends through banks in upstream direction and is there topped with concrete wall section.

New World's Record...
...Set at Coulee Dam

A WORLD'S RECORD which many construction men believe will stand unchallenged for a century, if not for all time, was set May 25 when crews of Consolidated Builders Inc. placed 20,684 c. y. of concrete in Coulee Dam. Average production was one yard of concrete every 4.18 seconds, or 861 c. y. every hour . . . . . .

Theoretical capacity of the mixing plant (operating on a 2-minute mix) had been placed at 18,432 c. y. By clipping seconds, and half-seconds, at every corner this theoretical capacity actually was exceeded by 2,252 c. y.—or about one-ninth!

NO DELAYS—The story of the record pour is a story of superb engineering management, splendid esprit de corps and mechanical perfection, in which every man and every machine performed his or its allotted task perfectly. There were no mistakes, no mechanical failures and no delays. . . . . .

SYNCHRONIZATION—Involved in the operation are the world's largest cement-handling plant, aggregate plant, belt conveyors, concrete mixing plant and concrete placing equipment. Exactly synchronized and geared to maximum capacity, all of these gigantic units functioned flawlessly throughout the record-breaking day. ***From one mid-night to the next, the mixing plant never stopped a second, the eight 4-yd. mixers revolving and tilting continuously.*** . . . . . .

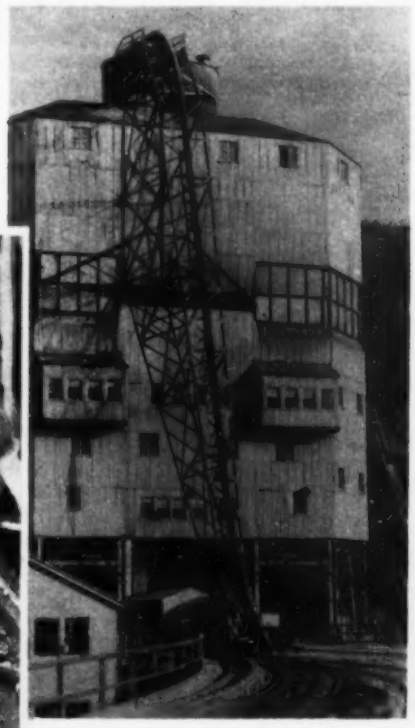
MIXING TIME REDUCED — Higher production of the day and swing shifts was aided by the fact that the Bureau of Reclamation allowed CBI to cut the mixing time five seconds in the morning and five more seconds in the afternoon and evening. Thus the graveyard shift used the normal two-minute mixing time, the day shift used 1 minute and 55 seconds; and the swing shift, 1 minute 50 seconds.

These successive reductions in mixing time were permitted because efficiency tests conducted by the Bureau's laboratories disclose that the resultant mix was in no way inferior to the regular 2-minute mix.

Efficiency tests are conducted periodically every day by Bureau engineers to determine if the cement is properly dispersed through the mix. If the mix is not within 10% uniform, the mixing time is increased. The 1 minute, 50 second mix ran well within the requirements of uniformity . . .

Excerpts from Pacific Builder and Engineer Issue of June 3, 1939.

CONGRATULATIONS to Consolidated Builders, Inc. for their Remarkable Achievement



Mixing Plant at Grand Coulee containing eight 4-yd. Koehring mixers.

Here's the sight that makes CBI officials smile. A 4-yd. Koehring mixer, such as this, dumps 24 batches an hour, sometimes 26 or 27. Theoretical capacity of the 8 4-yd. mixers, operating on a two-minute cycle, is 18,432 c.y. per day. They produced 20,684 c. y. on May 25 when mixing time was reduced. They operated for 24 consecutive hours without stopping once.

Koehring is indeed proud to have the privilege of being a part of the highly efficient organization for mixing and pouring concrete at this record breaking pace. We are proud Koehring mixers *did not fail* when called upon to do their share in establishing this record run. These mixers had poured more than 5,000,000 yards prior to this record run. Continuous service from Koehring equipment is that extra value you buy in all Koehring products.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

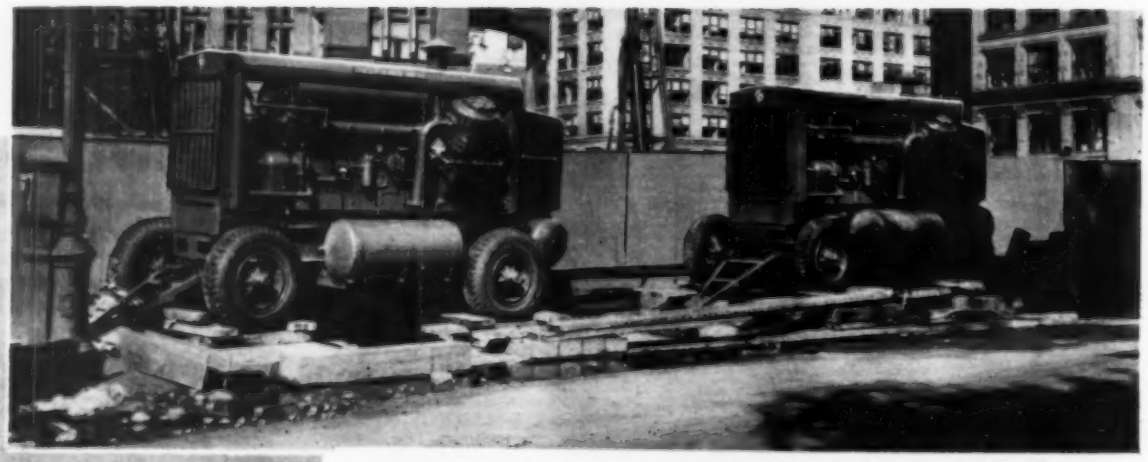
HEAVY-DUTY CONSTRUCTION EQUIPMENT

CONSTRUCTION EQUIPMENT NEWS

(ALL RIGHTS RESERVED)

Review of Construction Machinery and Materials for JULY 1939

SHOVEL ATTACHMENT FOR TRACTOR (right) has 3/8-yd. bucket for handling earth and 1½-yd. bucket for snow. Straight-line "crowd" is obtained by backing tractor. Bucket of Sargent overhead shovel, when filled, is hoisted straight up over tractor and dumped in front by tripping hinged cover. Has lift of 10 ft. for loading into high trucks. Caster wheel under front of shovel frame protects tractor springs from load of bucket when being dumped. One man operates both tractor and shovel. Two hand levers and foot brake are all that shovel attachment adds to tractor controls. Steel roof protects operator. Bulldozer blade, with down pressure, can also be rigged on front end of tractor by inserting four connector pins. Blade can be lifted 26 in. In loading snow standard 1½-yd. bucket can be increased to 2-yd. capacity by demountable extension. Weight of shovel attachment, with bucket and arms, is 4,200-lb. Outfit can be transported on 2-3-ton truck. — **Maine Steel, Inc., South Portland, Me.**



COMPOSITE TRUCK-MIXER LOADING PLANT (left) furnished to W. G. Haden Co., of Houston, Tex., has seven-compartment circular 22-ft.-diameter storage bin. Three compartments, two of 125-bbl. and one of 250-bbl. capacities, are for cement. Other four sections each hold 56 tons of aggregate which are loaded into bins by crawler crane with clamshell bucket. Bulk cement arrives on job in box cars where it is unloaded by screw feeder to vertical bucket elevator and distributed to three compartments by flop gates and chute. Driveway under plant is depressed into tunnel in order to accommodate height to reach of crane. Aggregate weighing batcher, 2 cu.yd., equipped with springless dial scale. Cement batcher, same size, has beam scale. Batcher operator said to be able to weigh out and load 2 cu.yd. batch of cement and aggregates in less than 1 min.—**Blaw-Knox Co., Pittsburgh, Pa.**

DIESEL-DRIVEN PORTABLE COMPRESSOR with actual capacity of 700 cu.ft. per minute consists of vertical, four-cylinder, four-cycle, medium-speed diesel engine on common crankcase and crankshaft with "V"-type two-stage, double-acting water-cooled compressor, together with suitable cooling systems and air receiver—all mounted on structural steel deck to form complete self-contained portable unit. Use of common base and shaft for compressor and engine avoids all clutch, gear and alignment troubles. Two stage, double-acting design assures smallest number of cylinders, pistons, valves and other parts, making for minimum maintenance expense. With oil at 6¢ per gallon compressor said to operate at full capacity, 100 lb. pressure, at fuel cost of only 51¢ per hour. Conservatively rated, unit is suitable for 24-hr. service.—**Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.**

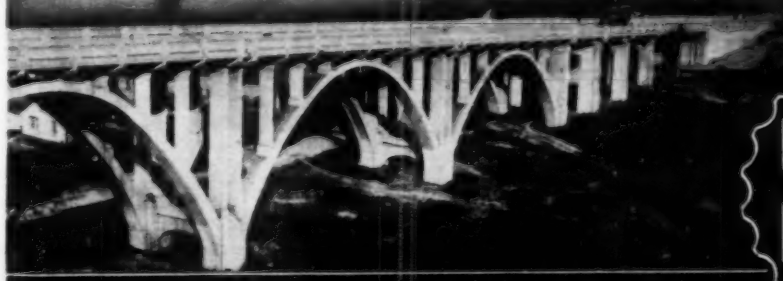
The "EYES" have it FOR THOROUGH INSPECTION OF TAPERED MONOTUBES

● There can be no doubt about the quality of the substructure where Union Metal Monotubes are used. After driving, these sturdy Monotubes can be inspected to the very toe before filling with concrete. Procedure is simple. By merely lowering a light into the interior, you can obtain quick visual proof of their soundness.

Other important engineering advantages of Monotubes are—

1. **Higher load-supporting values.**
2. **Adaptability to varying soil conditions.**
3. **Economy of installation.**

All of these facts are covered in detail by Union Metal Catalog No. 68. Write for your copy now.



UNION METAL

THE UNION METAL MANUFACTURING CO.

CANTON OHIO

GOODALL

"INFERNO" STEAM HOSE

For temperatures up to 400° F.
For pressures up to 200 lbs.

Your experiences with other kinds of steam hose will serve only to increase your respect for "INFERNO" — especially on unusually *tough* assignments in high temperature, high pressure steam service.

"INFERNO" is a steam hose of massive construction, made of high tensile asbestos cord, braided into and protected by the most efficient rubber compound on the market. The safety in handling this hose is increased by the special GOODALL construction, which, if the hose is damaged, will cause the steam to be diffused instead of escaping in a sudden burst. Recommended for pressures up to 200 lbs. and temperatures up to 400° F., GOODALL "INFERNO" insures the *lowest cost for service* when used with pile drivers, steam hammers and on all high pressure, high temperature applications in railroads, ship yards, construction operations, oil refineries, etc.

The outstanding performance record of "INFERNO" entitles it to *first consideration* the next time you have an important steam hose job.

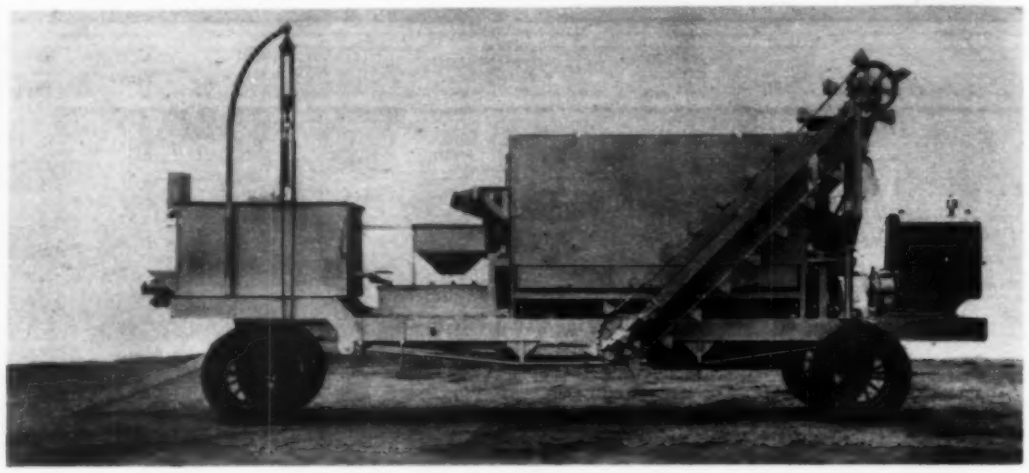
Made and stocked in all sizes from ½" to 2" I. D., in maximum lengths of 50'. Let us quote on your requirements.

GOODALL RUBBER CO.
5 S. 36th STREET, PHILADELPHIA, PA.
New York • Chicago • Pittsburgh • Boston • Houston
FACTORY: TRENTON, NEW JERSEY

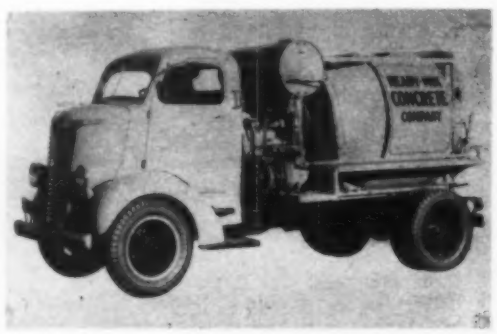
GOODALL RUBBER CO. of CALIF.
San Francisco • Los Angeles • Seattle
Salt Lake City • Phoenix

GOODALL — The originators of the Standard of Quality Line (Reg. U. S. Pat. Off.) of contractors' rubber goods

PORTABLE REPAIR TRUCK containing aggregate dryer, pug mixer and other necessary equipment for maintenance of bituminous pavement and resurfacing of concrete and brick, may be had in two sizes of 4 and 8 tons per hour capacities. Model shown is equipped with aggregate dryer consisting of rotating drum 34½ in. by 6 ft. mounted on SKF bearings with internal cascading shelves. Inclosed in asbestos lined housing and has four self-generating oil burners. Pug

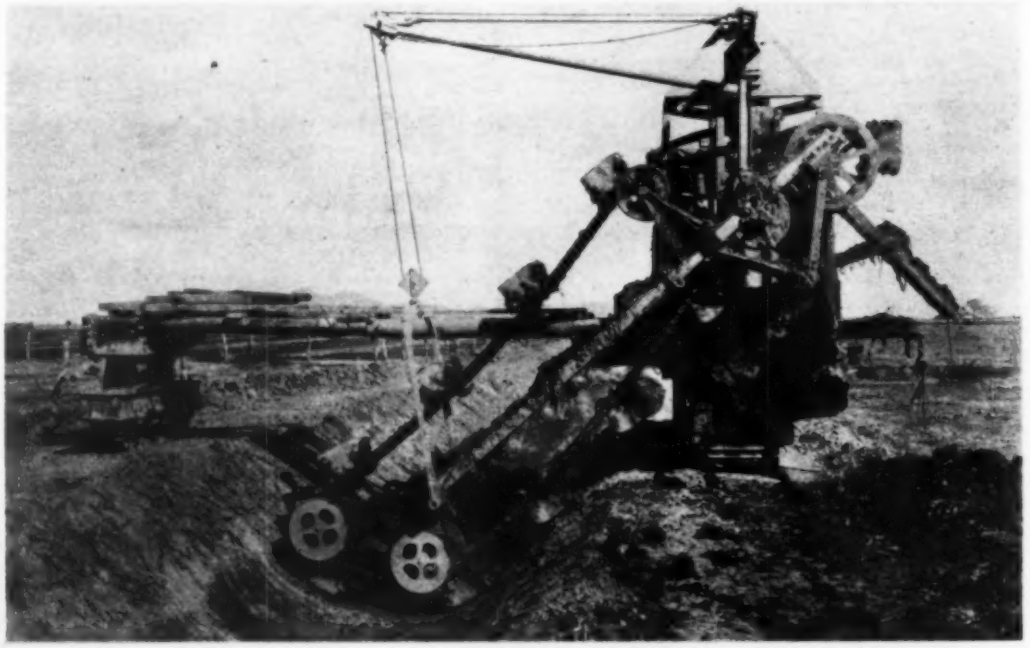


mixer is of 500-lb. capacity with single axle mounted on roller bearings and bottom discharge. Tar kettle of 165-gal. capacity mounted at front end. Cold loading bucket elevator is pivoted to swing up along side dryer when traveling. Measurement of material is by volumetric hopper and graduated bitumen trough. Burners supplied by 60-gal fuel tank with rotary-type engine-driven pump. Powered by 20-hp., 4-cylinder industrial gasoline engine. Steel frame chassis, rigidly braced with semi-elliptic springs. Timken bearing wheels and 4 pneumatic tires. Weight, 9,000 lb.—**White Mfg. Co., Elkhart, Ind.**



1939 TRUCK MIXER AND AGITATOR, known as Rex Moto-Mixer, has been improved to meet recent ready-mixed concrete mixing and hauling problems and to assure lower cost per ton mile in its operations. Features either new or improved: (1) Drum that has proper cone-end for fast, efficient mixing — eliminates "dead ends" and need for "throw-back" blades; (2) three-point mounting with box girder front drum pedestal and railway-duty SKF ball bearing; (3) multiple speed transmission developed to end unsatisfactory features of two-speed types of drum control; (4) self-measuring water system; (5) box-type steel frame. Other features: non-hinged lightweight charging door, top discharge controls, cab control of mixing speeds, friction throttle, one-man "jiffy" spout. Drum capacities for Rex Moto-Mixers and agitators range from 1½ to 7 cu.yd.—**Chain Belt Co., Milwaukee, Wis.**

EXCLUSIVE MANUFACTURING RIGHTS to Ruth dredger have been acquired by Bucyrus-Erie Co., South Milwaukee, Wis. and henceforth, unit will be called Bucyrus-Ruth excavator. This machine, for constructing and maintaining irrigation and drainage ditches of different depths, widths and slopes, has as digging unit chain of buckets supported on ladder which may be swung to either side for digging,



or directly to rear for traveling from job to job. Digging unit moves up, down or sideways while working, enabling operator to maintain accurately depth and ditch contour even when path over which machine is moving varies in elevation and alignment from ditch. Once ditches are built, machine is used to remove silt and vegetation and keep bank slopes smooth and uniform. Excavator can straddle ditch or can work with both tracks on one bank. Operates as easily in wet ditch as in dry one and therefore can remove silt and vegetation without interrupting water service.

WHAT'S THE DIAMETER OF THAT SHEAVE?

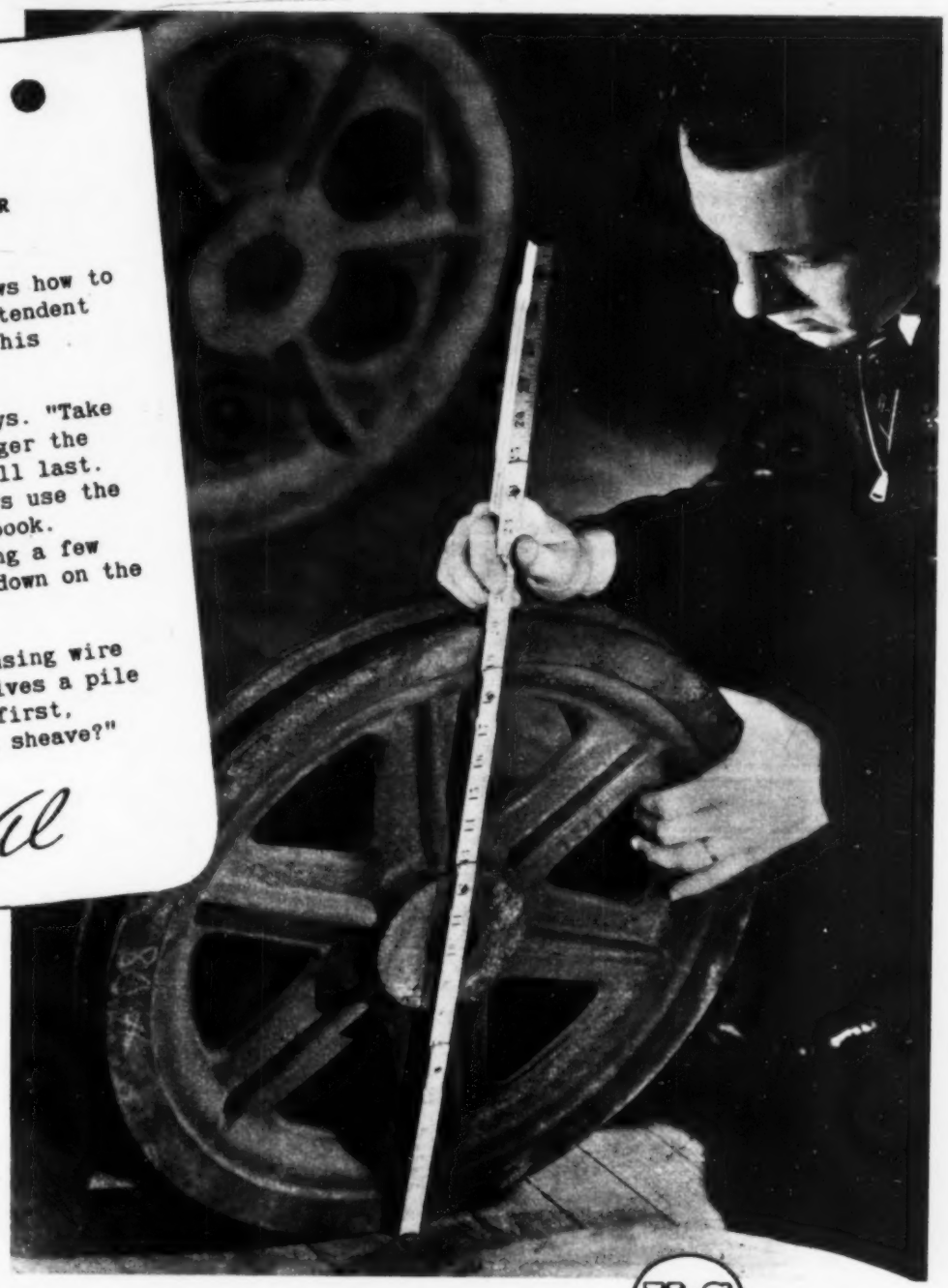
FROM THE DAILY REPORT OF A TIGER BRAND WIRE ROPE ENGINEER

If there ever was a man who knows how to use wire rope, it's the superintendent here. This AM I asked him what his secret is.

"Just good horse sense," he says. "Take sheaves, for instance. The larger the sheave, the longer the rope will last. Anybody knows that. So I always use the size recommended in your handbook. What's the percentage of saving a few cents on a sheave if it cuts down on the life of the rope?"

He's right. A lot of people using wire rope today would save themselves a pile of grief if they'd just ask first, "What's the diameter of that sheave?"

Yours, *al*



TO get the most satisfactory rope life on your equipment, use large sheaves. Undersize sheaves cause high bending stresses which in turn cause wire failures of the square off type (fatigue breaks) to occur.

Another result of small sheaves is accelerated wear. Pressure of a rope on a sheave is inversely proportional to the sheave size. If the sheave is too small, this excessive pressure will cause both rope and sheave groove to wear out rapidly. Small sheaves also reduce rope strength, because the individual strands and wires cannot adjust themselves properly to an unduly sharp bend.

That's why it's vitally important to use sheaves that are of adequate diameter. In general, follow this table. In case of question, our engineers will be glad to consult with you.

WIRE ROPE	SHEAVE FACTOR Recommended*	Minimum*
6 x 7	72	42
18 x 7	51	34
6 x 19	45	30
6 x 21	45	30
6 x 25	45	30
6 x 30	45	30
8 x 19	31	21
6 x 37	27	18
5 x 19	27	18

*times rope diameter

USS

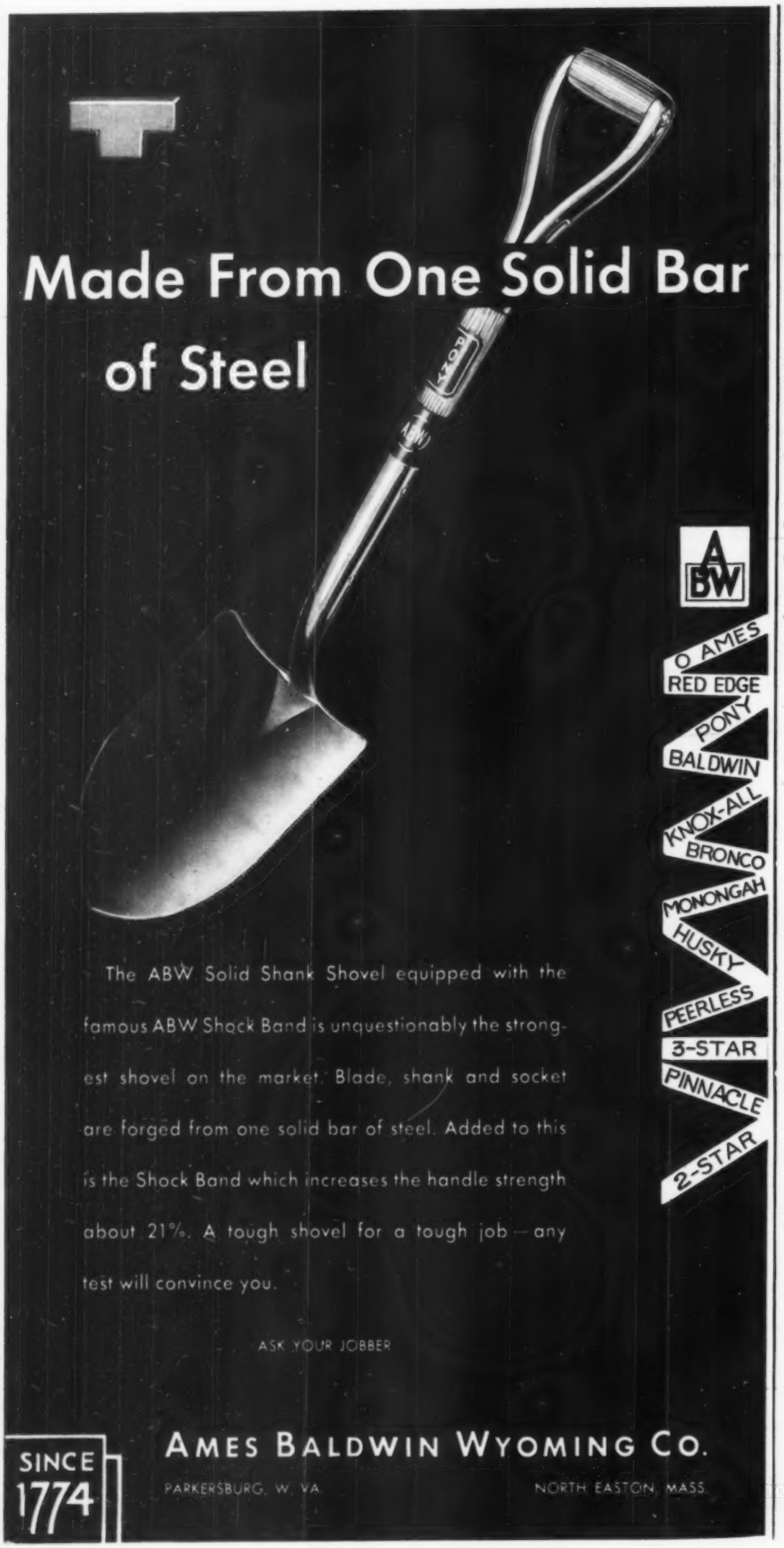
EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

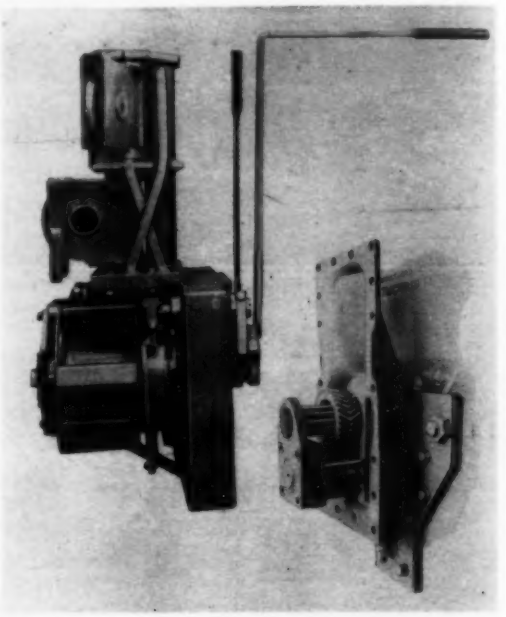
COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL


Made From One Solid Bar of Steel
A BW
AMES
RED EDGE
PONY
BALDWIN
KNOX-ALL
BRONCO
MONONGAH
HUSKY
PEERLESS
3-STAR
PINNACLE
2-STAR
The ABW Solid Shank Shovel equipped with the famous ABW Shock Band is unquestionably the strongest shovel on the market. Blade, shank and socket are forged from one solid bar of steel. Added to this is the Shock Band which increases the handle strength about 21%. A tough shovel for a tough job — any test will convince you.
ASK YOUR JOBBER
SINCE 1774
AMES BALDWIN WYOMING CO.
PARKERSBURG, W. VA.
NORTH EASTON, MASS.

POWER CONTROL UNIT (Model T) said to provide better controlled power and greater job flexibility on decreased equipment investment, made possible by following features: (1) Interchangeable neck and gear case; (2) interchangeable drums of vary-

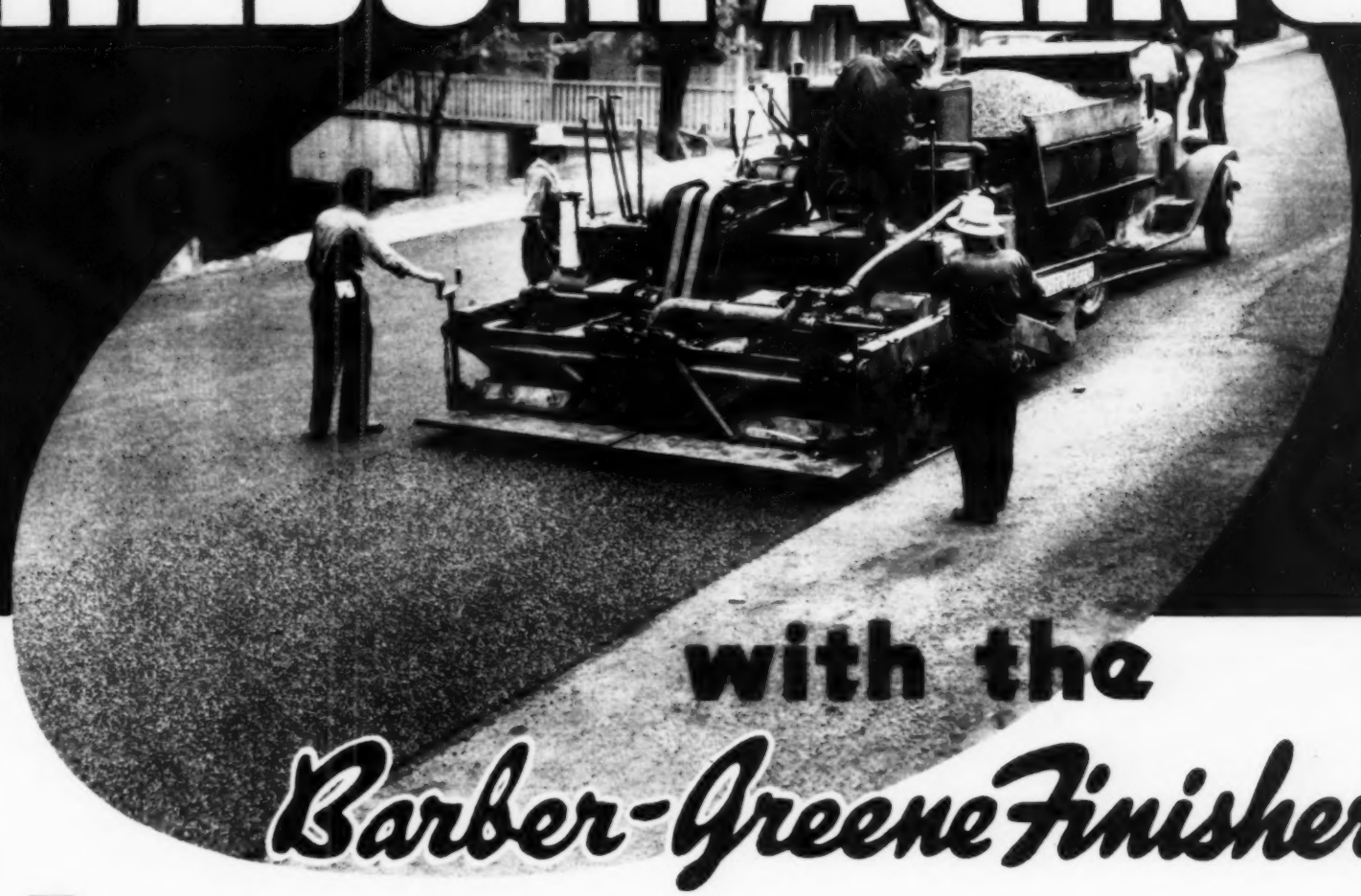


ing cable lengths; (3) new brake assembly, using Timken bearings, that takes play and slack out of brake and gives operator more accurate hair-trigger control; (4) interchangeable reduction gear sets for neck — to regulate and control line speeds; (5) improved brake and clutch assembly that automatically eliminates all brake drag when clutch is engaged; (6) "Velvetouch" brake lining (optional) for longer wearing, smoother operation; (7) controlled lubrication through new oil ring; (8) herringbone gears at vital points. Three different cable drum lengths, 4, 7⅝ and 14⅝ in. are available. — **R. G. Le Tourneau, Inc., Peoria, Ill.**

CUSTOM PANELING cut to size and finished to order in wood grain, marble, tile and tone pastel finishes is available, under the name Luxor, for residential or commercial building interiors. The base material of the paneling is Masonite Presdwood processed so that the wood grain is actually

laid down underneath a highly wear-resistant outer surfacing which, it is claimed, will not peel, chip or warp. Thickness of paneling recommended for ease of application and close fit at joints is 1/10 in., although boards of ⅛-, ¼- or ⅜- and 5/16-in. thickness may be ordered. Weighs 63 lb. per 100 sq.ft. in 1/10-in. thickness. Applied with mastic like any wall panel board. Can be ordered in exact size of sheets desired, although standard sheets are available in five sizes from 4x6 ft. to 4x12 ft. — **Allied Display Crafts (Luxor Products Division), 3201 Forbes St., Pittsburgh, Pa.**

RESURFACING



with the Barber-Greene Finisher

EACH year larger appropriations are made for resurfacing concrete, brick, and bituminous pavements that are no longer adequate for modern traffic.

The Barber-Greene Tamping Leveling Finisher was essentially designed for the many peculiar needs of resurfacing. It automatically levels, and uniformly compacts the material to stay level under rolling and traffic. *The ingenious B-G design permits the laying of a thin wearing course over level pavements, or over the high spots, using only the minimum tonnage in either case. Fine material has been laid as thin as ¼".* The old road width can be retained or widened, and the old crown can be followed or changed as desired. The super-elevation on curves can be increased to suit the higher speeds of modern traffic — all in the resurfacing operation.

The quality and controlled operations of the Barber-Greene substantially reduce labor around and behind the machine. Rolling and truck time are materially reduced. The finished job actually costs less in spite of its incomparably superior quality and longer life.

There is no question of what machine for those who know all the facts. Even those owning other equipment for finishing find they can save money by switching to Barber-Greene. This booklet will give *you* the facts. Phone, write, or wire for your copy.

39-8

BARBER-GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS

YOU WERE 15 YEARS YOUNGER WHEN THIS THERMOID CONVEYOR BELT WENT INTO SERVICE

In 1924 George F. Pettinos, Inc., placed a 600 foot section of Thermoid Conveyor Belting into service in Millville, N. J. Six years later, when the conveyor was enlarged, they added an additional 300 foot section to the original belt. *All 900 feet of belt are still in daily service and carrying loads up to 60 tons per hour.*

During the entire time no major repair has ever been made to any part of the belt and there is no indication that the belt will not remain in service for years to come.

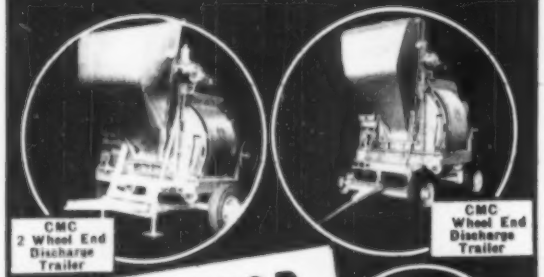
As outstanding as this service record is, Thermoid users will recognize a parallel in their own experience with Thermoid Products. Thermoid Conveyor Belt turns in these kinds of records because it is built for its specific job by engineers who know service conditions through years of practical experience. This engineering, plus experienced, conscientious manufacturing, using only the finest of raw materials, guarantees the ultimate in service and economy.

This unretouched close-up clearly shows the fine condition of the belt in spite of its long record of service.

THERMOID RUBBER, DIVISION OF THERMOID COMPANY, TRENTON, N. J.

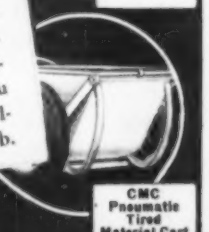
Thermoid

FLAT AND V BELTS • HOSE • PACKINGS • BRAKE LININGS



YOURS FOR PROFITS!

Here's the newest in money-making equipment. One, two and three-bag Mixers that push up daily output — no dead weight — fast moving — built to "take it". With modernized CMC equipment you are ready to get the last dollar of PROFIT on any job.

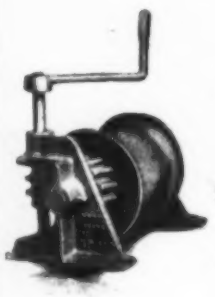


SEE CMC BEFORE YOU BUY!

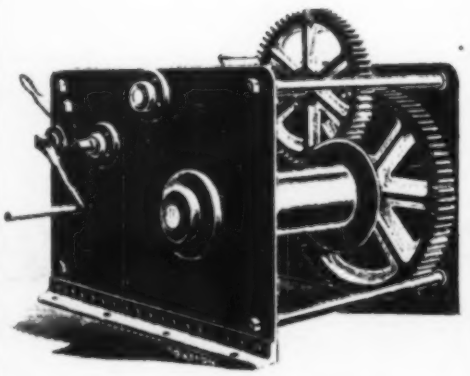
Mixers all sizes — Plaster and Mortar Mixers — Dual Prime Pumps — Hoists — Saw Rigs — Pneumatic Tired Carts and Barrows. New catalog sent free.

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA

DOBBIE WINCHES



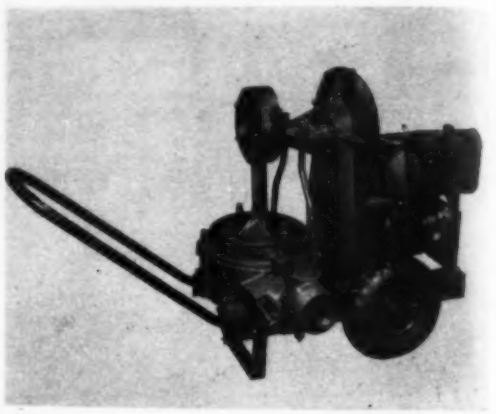
A Dobbie Winch for every purpose.
From 100 pounds to 50,000 pounds capacity on a single line.
With ease and safety.



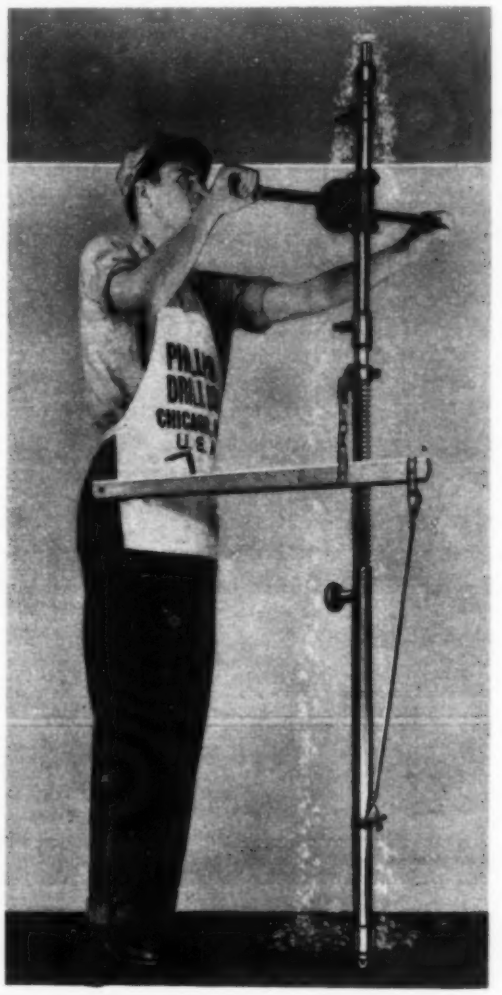
Dobbie Foundry & Machine Co.
Niagara Falls, N. Y.

Other Dobbie Products—Steel Derricks, Timber Derrick Fittings, Hand Winches, Motor Driven Winches, Blocks, Sheaves, etc.

LIGHTWEIGHT, 3-IN. DIAPHRAGM PUMP for dewatering jobs on construction work, for handling seepage as well as water laden with foreign matter, earth and sticks. Capacity, 3,000 g.p.h. at 10-ft. suction and 1,500 g.p.h. at 20-ft. suction. Has completely inclosed gearing and double-braced eccentric which transmits power to pump replacing former cumbersome walking beam. Powered by 2½-hp. air-cooled, anti-friction engine. Weight, skid-mounted, 370 lb. May also be mounted on two-wheel, steel or pneumatic-tired truck. Advantages: (1) Fast priming due to close clearance; (2) specially designed rubber and fabric diaphragms for reducing operating costs; (3) accessibility — removal of four brass nuts permits inspection of both valves and two additional nuts remove diaphragm. — **Novo Engine Co., Lansing, Mich.**



IMPROVED SPRING HAMMER designed primarily as floor to ceiling tool for drilling upward holes and installing self-drilling expansion shells in concrete ceilings, but said to be equally efficient for drilling from scaffolds. Self-drilling shell drills its own hole and is then expanded to make permanent dependable fastening. Shells ⅜- to ½-in. diameter may be installed in 1 min. Photo shows device equipped with cranks for manual operation, but power-drilling unit is interchangeable by screw-out, screw-in method. — **Phillips Drill Co., Dept. B, 1537 Cortland St., Chicago, Ill.**



In the road-building industry today it's SOIL STABILIZATION

A large Soil Stabilization project in Fort Bend County, Texas, which called for 1,500,000 gallons of TEXACO RC Surfacing Material No. 3, a rapid-curing cutback asphalt.

Soil Stabilization is one of the most important recent forward steps in road and street construction. Page after page in engineering journals and speaker after speaker at engineering meetings discuss the significant effect of this development on road building economy and efficiency.

As in many other phases of highway and street construction and maintenance, TEXACO Asphaltic products accurately meet Soil Stabilization needs in all parts of the country.

One of the outstanding 1939 Soil Stabilization projects to date has been undertaken by Fort Bend County, Texas. TEXACO RC Surfacing Material No. 3, a rapid-curing Cutback Asphalt, is being used. This project will require approximately 1,500,000 gallons.

For practical, helpful assistance in selecting the correct TEXACO Asphaltic product for your Soil Stabilization project, call on our laboratory and field organization for co-operation. Write us today.

TEXACO *asphalt*

THE TEXAS COMPANY *Asphalt Sales Department* 135 East 42nd Street, New York City

Chicago Cleveland Kansas City Philadelphia Houston Jacksonville Buffalo Richmond Boston

GASOLINE • DIESEL OR ELECTRIC POWER

has everything that a hoist needs to take care of today's hoisting needs, PLUS — a reserve of strength and capacity for tomorrow's accelerated requirements. Get the utmost for your hoisting engine dollar — buy for today AND TOMORROW.

These Modern Features Mean Greater Efficiency; Insure Your Profit

1 — Outside Contracting Band Frictions — Simplest, easiest and most natural of all frictions in operation; easiest and cheapest to adjust and repair. Clutches at opposite end of drum from brake for cool running.

2 — Electric welded steel frame and bed for greatest strength with minimum weight.

3 — Levers grouped within easy reach of operator's adjustable seat.

4 — Silent chain drive to shaft between two drums; does away with pinion and 3 to 6 power wasting gears.

5 — It grows with the work — a second and a third drum, also slewing attachment, can be added in the field.

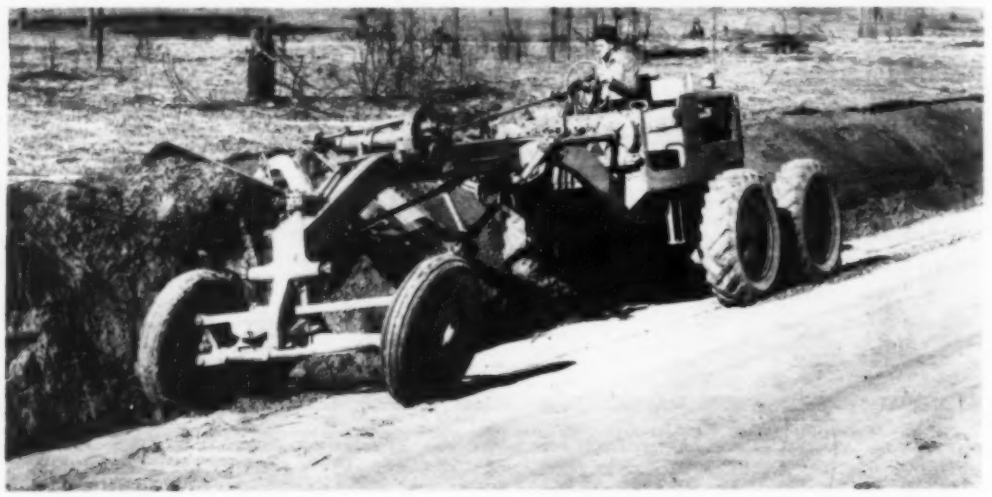
American Hoist and Derrick Co.
Saint Paul, Minn.

AMERICAN TERRY DERRICK COMPANY
South Kearny, N. J.

Branch Offices
NEW YORK & CHICAGO

HOIST BUILDERS SINCE 1883

MOTOR GRADER, designed to handle entire roadbuilding job from bank to bank under many conditions, is available either with gasoline or diesel power, both engines having four cylinders with bore of 4¼ in. and stroke of 5½ in. and developing 46 maximum horsepower at 1,500 r.p.m. Grader features unlimited number of blade positions. 12-in. blade will reach more than 6 in. outside line of wheels, can be set to cut banks up to 90 deg., and can be turned completely around. In reverse

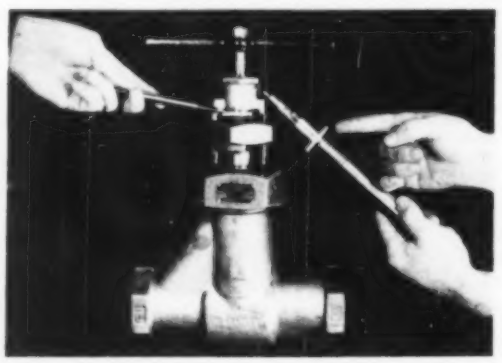


position blade may be set for ditching or blading, permitting working back and forth on one side of regrading job without turning machine around. Four forward speeds with a low of 1.8, two intermediates of 2.7 and 4.3 and high of 10 m.p.h. provide correct speeds for all types of jobs. Reverse is 2.4 m.p.h. Low pressure tired tandem or single drives available. Attachments include: V-type scarifier, straight-type scarifier, V-type snow plow and roller. Standard equipment includes leaning front wheels and two braking systems, one hydraulic and one mechanical. — **Caterpillar Tractor Co., Peoria, Ill.**

METAL SPRAY GUN said to fulfill requirements for rust proofing, fire protection covering, corrosion protection, automotive body work and for spraying scale models for design approval. Advantages: (1) Blow torch said to be sturdy and trouble free;

(2) low fuel cost — makers claim gun operates 4 hr. on 5¢ worth of gasoline; (3) requires low air pressure and volume; (4) uses any standard rods or bars of solder; (5) nozzle designed for ruggedness and simplicity; (6) instantaneous control of spray; (7) reserve of molten metal to maintain temperature under heavy use. — **The Turner Brass Works, Sycamore, Ill.**

IMPROVED FORGED AND CAST STEEL VALVES are equipped with stem thread bushings made of Duronze (an aluminum copper silicon alloy) which, makers claim, makes satisfactory operation possible without lubrication of stems at elevated pressures

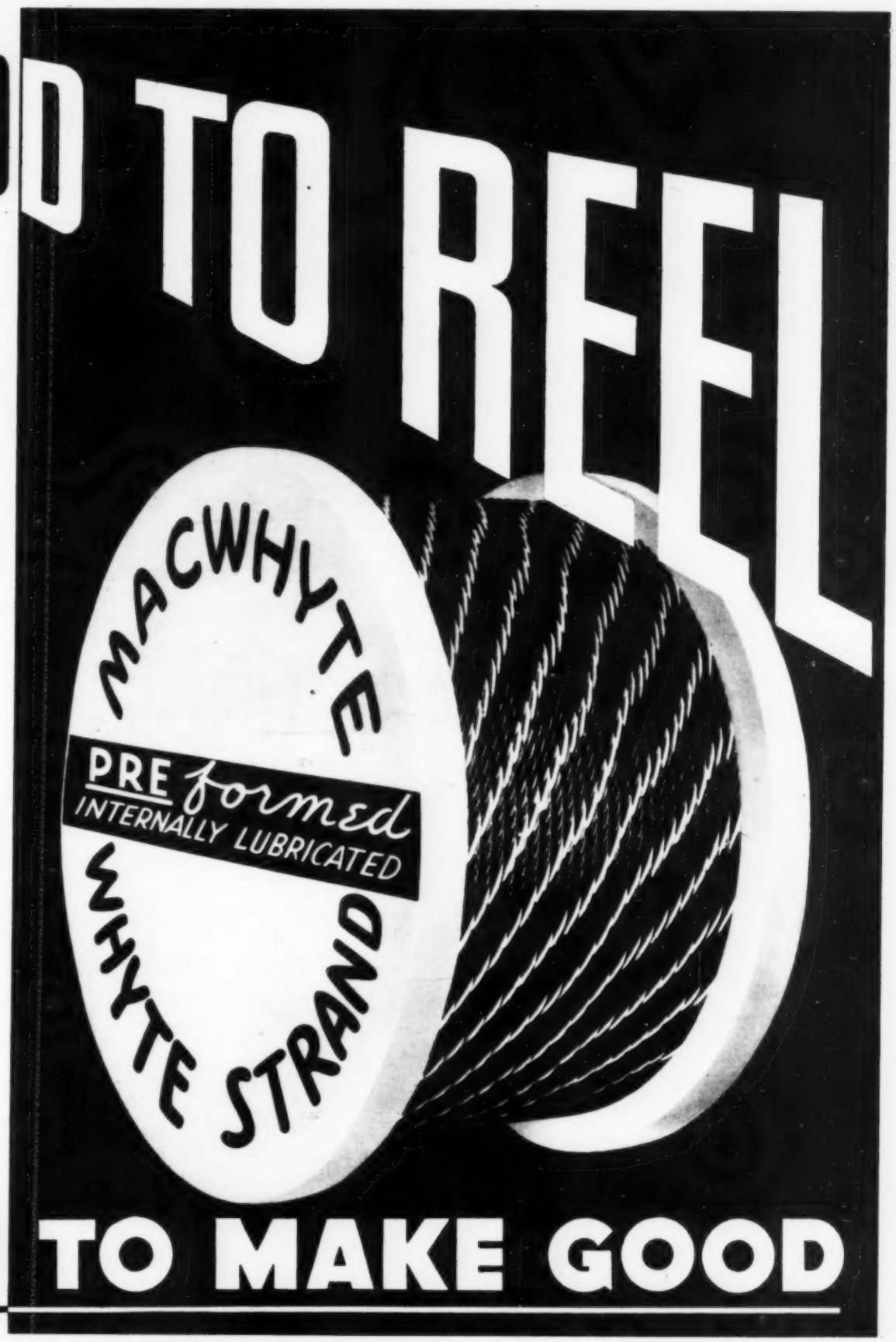


and temperatures, when grease or oil is apt to pick up construction dust, fly-ash or pulverized coal which act as abrasives and wear away stems and bushings. Bushings have exceptionally low coefficient of friction and very high resistance to wear and corrosion, plus tensile strength of 90,000 lb., and can be economically replaced, saving cost of new valve stem and bonnet. — **Hancock Valve Division, Manning Maxwell & Moore, Inc., Bridgeport, Conn.**

WATERPROOF GALVANOMETER said to be proof against moisture and water even under conditions found in large tunnels and shafts. Advantages: (1) Non-corrosive, lighter case; (2) higher factor of safety — longer cell life. Full scale deflection re

quires but 8 milliamperes of current; (3) separate cell compartment — no need to expose delicate mechanism to replace chloride of silver cell; (4) newly designed cover, flap of which doesn't have to be unbuttoned when testing. Dial is read right side up through slot in case. Wires held naturally against contacts at bottom of case. Of particular interest to workers in large shafts, tunnels and other underground operations. — **Atlas Powder Co., Wilmington, Del.**

FROM ROD TO REEL



MADE TO MAKE GOOD

From the approved hot rolled wire rods thru Macwhyte's furnaces, cleaning, baking, cold drawing of wire, and fabrication of wire into wire rope—at every step of the way Macwhyte Wire Rope is made to make good.

ASK FOR A MACWHYTE WIRE ROPE RECOMMENDATION

IT'S LABORATORY TESTED . . . Not just ordinary, routine tests, but *exacting, severe* tests . . . many of them . . . are given all Macwhyte ropes. Which means that when they're given a "final OK" at the mills, Macwhyte Wire Ropes are ready for dependable, economical service.

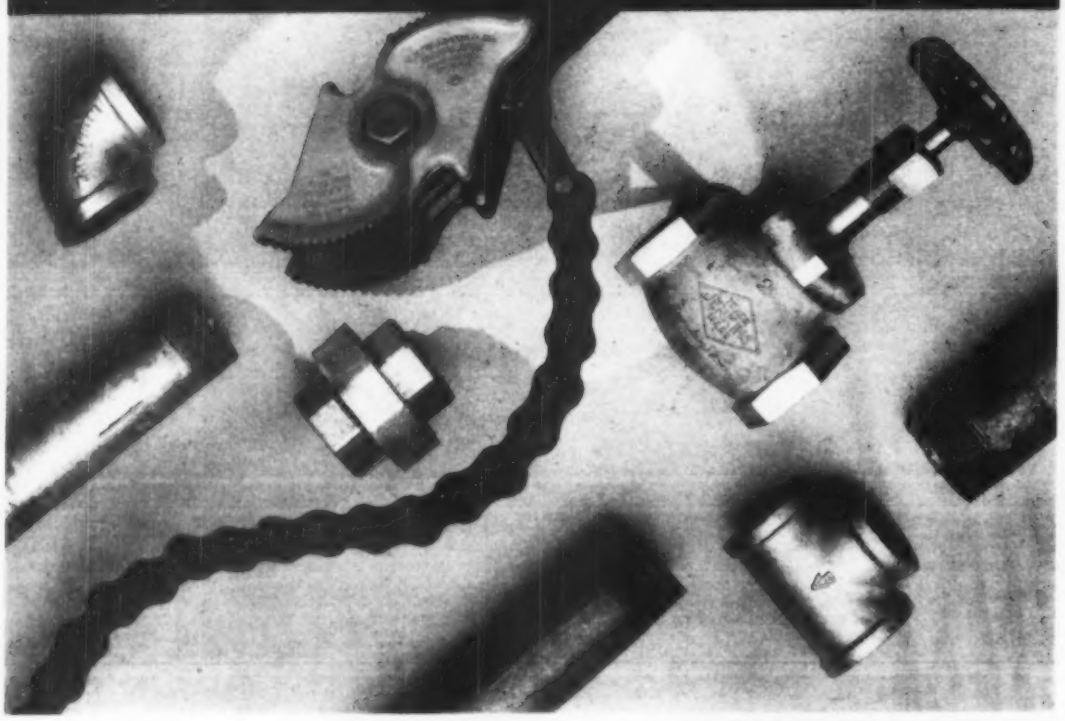
AND IT'S FIELD PROVED . . . On all kinds of jobs, on all kinds of equipment, under all kinds of conditions, Macwhyte ropes are constantly being proved. All year long, Macwhyte Engineers out on the job are constantly proving, improving, perfecting the *right* wire rope for your specific job.

NO. 426

MACWHYTE COMPANY
KENOSHA, WISCONSIN
Manufacturers of wire rope and braided wire rope slings . New York . Chicago . Pittsburgh . Ft. Worth . Portland . Seattle . San Francisco . (distributors throughout the U. S. A.)

MACWHYTE
Whyte Strand - PRE *formed* WIRE ROPE

"VULCAN SUPERIOR" TONGS



handle both PIPE *and* FITTINGS

• "Vulcan Superior" is an ideal tong for big construction jobs. It will handle both pipe and fittings without adjustment or change of a single part. No. 3-½ "Vulcan Superior", for example, will handle anything from 1 to 6″ pipe size, whether it be fittings, pipe, or bar—round, hex or square in shape.

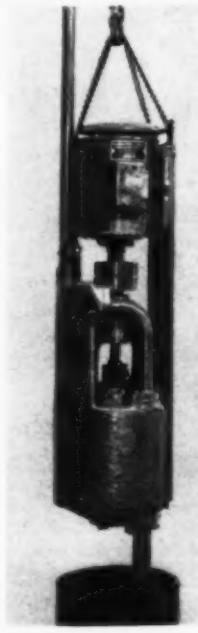
"Vulcan Superior" is the only chain tongs with *reversible* pipe-and-fittings jaws. When one set of teeth begins to wear, simply remove the through-bolt and reverse the jaws. You can get "Vulcan Superior" Tongs in 7 sizes, with either Flat Link or Cable chain, for pipe and fittings ⅛ to 12″.

The "V" recess in the jaw does it!

The "V" recess in the jaws assures quick and positive grip on fittings. This recessed jaw construction, combined with the general design, gives "Vulcan Superior" a greater number of grips or "bites", both on pipe and fittings, than ordinary tongs. One-spot wear on the teeth is prevented and ease of operation provided.

J. H. WILLIAMS & CO. HEADQUARTERS FOR 225 LAFAYETTE ST., NEW YORK

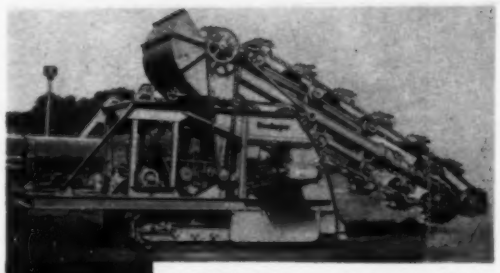
SELF-PRIMING VALVELESS CENTRIFUGAL PUMP, capacities up to 100 g.p.s., for removing mud from sumps, dredging river beds and canals, handling sand and gravel, and draining marshes. Has as its fundamental feature circulating system which communicates with suction nozzle and pressure pipe, and removes automatically air in water column inducing self-priming. Another feature: arrangement of auxiliary injectors in suction pipe which force upwards water column drawn from above. These injectors do not cause narrowing of pipe section and make possible increase of suction head to more than 32 ft. and at times even to 69 ft. Absence of valves enables pump to draw and deliver not only sand and small stones but even pieces few inches in size. Suction nozzle can easily reach inaccessible spots as when dredging under masonry. Hard ground loosened by water jets around opening of suction piece and by moving grates fitted with sharp teeth and actuated by motor. Teeth loosen ground and facilitate removal of stone. Horizontal or vertical types or combined in one model. Suitable for high or low pressures.—**Sihl Engineering Works, Zurich, Switzerland. U. S. representative, Max Lauchenauer, 112-26 69th Road, Forest Hills, L. I., N. Y.**



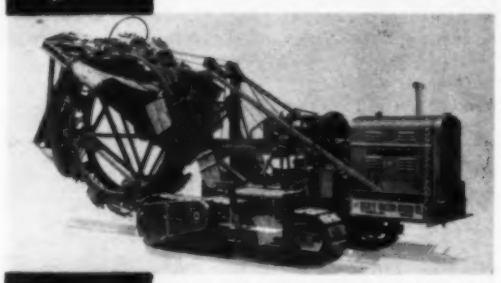
MULTIPLE PASSAGE WELDING HOSE, invented by Michael Berman and William Brockner, and used to convey oxygen and acetylene for welding and cutting, consists of two lines of flexible cord-reinforced welding hose molded into single unit. Will not kink, writhe nor twist under high pressure. Taping is unnecessary. Individual passages are interlined with non-blooming, gas resisting cord-reinforced compound. Available in any desired cut length or continuous lengths as long as 500 ft. to be cut when needed. Hose installed by splitting with knife along joint line at each end sufficient distance to form convenient "Y" at both tank and torch ends. Then ferrules, supplied with hose, are crimped permanently to prevent any further separation of hoses.—**Hewitt Rubber Corp., Buffalo, N. Y.**

REMOVABLE STEEL SPACER is designed to offer contractors cheap and satisfactory means of holding sides of concrete wall forms proper distance apart. Spacer is made of stiff steel wire of small enough diameter not to retard flow of concrete or create voids. Washers provide bearing areas on ends of spacer. Spacers may be left in structural concrete but in architectural concrete, where rust stains would be objectionable, spacers can be tamped down as concrete is poured or removed,

DITCH



Model 160 . . . cuts trench 18" to 42" wide and to 12' 6" deep. Similar to Model 120 but larger and heavier. It handles 75% of all ditching jobs.



Model 12 The "Pipe Liner" Wheel Type Ditcher for fast going and long runs of trench 15" to 24" wide and to 5½' deep. Buckeye originated the wheel-type ditcher, and more Buckeyes are in operation than all other makes combined.

Model F Backfiller . . . it completes your profit making equipment for ditching jobs. Fast, easily maneuvered . . . weighs only 4 tons.

Trailers . . . for quick transportation of any Buckeye machine . . . or other construction equipment.

Buckeye DITCHERS

IF YOU ARE INTO A DITCH . . . OR IN FOR A DITCH... that old problem of getting out with a profit is always there... especially if slow methods, obsolete or inadequate equipment are used.

Buckeye Ditchers are your best profit assurance on any ditching job . . . reliable, fast and efficient.

Buckeye . . . the only complete line in the world . . . gives you the right machine to lick any specific job or your average job.

If you are "fed up" on ditching losses . . . then you need a Buckeye. Mail the information request today.

Model 120 Service Ditcher . . . the money maker for small sewer and water line jobs . . . 18" to 30" wide to 11' 6" deep . . . shiftable boom . . . cuts to within 4 inches of curbs . . . easily maneuvered and transported.

BID THE Buckeye WAY • ask for our operation data before you bid •

THE BUCKEYE TRACTION DITCHER COMPANY
FINDLAY, OHIO
MANUFACTURERS OF
CONVERTIBLE EXCAVATORS • BACKFILLERS • TRAILBUILDERS • SCRAPERS
BULLDOZERS • RIPPERS • TRACTOR POWER CONTROL UNITS

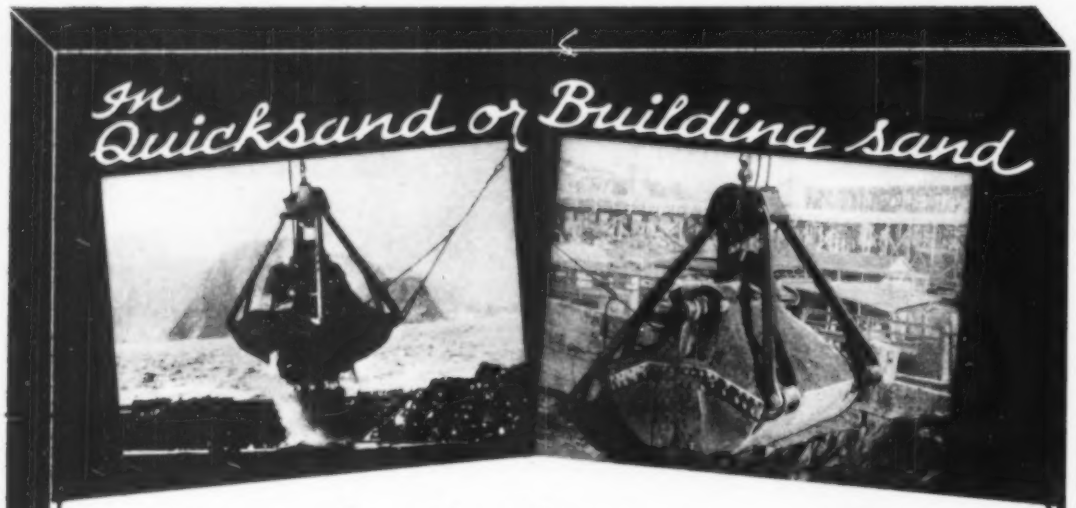
Originators of the wheel type DITCHING MACHINES

PLEASE SEND COMPLETE INFORMATION AND PRICES ON ☐ DITCHERS ☐ BACKFILLERS ☐ TRAILERS

NAME _____ ADDRESS _____

CITY _____ STATE _____

EARTH HANDLING AND ROAD BUILDING EQUIPMENT FOR OVER 40 YEARS



—tough digging or easier rehandling,

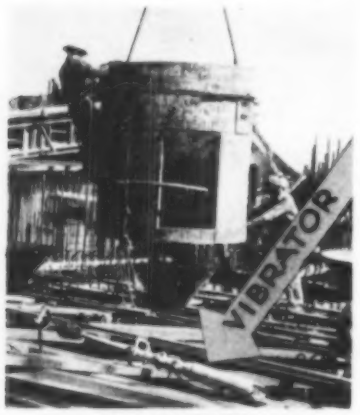
AN Owen Bucket will handle a greater range of work profitably than any other kind and type of bucket.

An Owen Bucket is adaptable to various digging conditions by simply changing the reeving or the amount of counterweight. It is designed for use with ingenious attachments which aid in handling difficult contracts profitably.

The OWEN BUCKET Co.
6020 Breakwater Avenue, Cleveland, O.
Branches: New York Philadelphia Chicago Berkeley, Cal.

Owen Buckets Get A MOUTHFUL AT EVERY BITE

JACKSON
CONCRETE VIBRATORS



The JACKSON VS-El
Hansen Dam—California

ELECTRIC

JACKSON ELECTRIC VIBRATORS, Models VS-El and VS-4, are being used to place the concrete on Hansen Dam. Because they're fast, dependable and economical, they are the choice of many of the largest contractors for all their jobs.

Many sizes are available from 1¾" to 6" in dia.—a size for your job. Choose either the Electric or Hydraulic type depending on job conditions.

Ask for a Demonstration.

HYDRAULIC

ELECTRIC TAMPER & EQUIPMENT COMPANY
LUDINGTON, MICHIGAN

Write for **"INDEX TO THE RIGHT JACKSON VIBRATOR FOR YOUR JOB"**

GET THE HOOK
that you can bet your life on

LAUGHLIN
DROP FORGED HOOKS

There's no substitute for drop forging. Safety and long run economy demand that you use LAUGHLIN trustworthy wire rope and chain fittings, drop forged and finished by a 70 year old company in a new plant with the latest precision equipment.

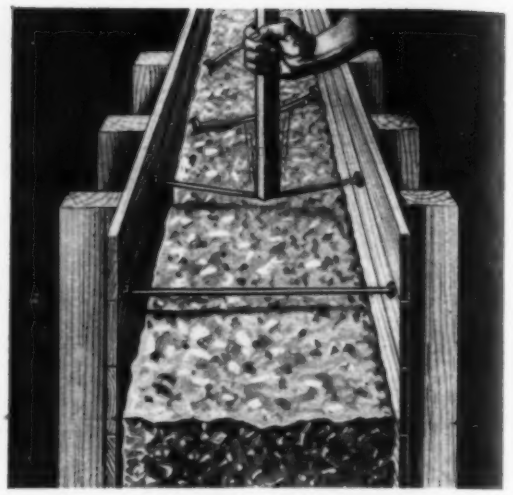
Recently developed electrical devices automatically control temperatures in our heat treating department insuring fittings that match today's stronger wire rope and chain.

You can quickly obtain through your industrial distributor LAUGHLIN Drop Forged Steel HOIST HOOKS, Grab Hooks, (with extra large eye) Safety Hooks, Missing Links (oval and pear shaped), Turnbuckles, Eye Bolts Shackles, Thimbles, Swivels, Sockets and Clips.

DIRIGO SAFETY HOOK. The bronze tongue provides extra safety. Ample room left for heavy attachments to pass. Sizes for throat opening ⅛" to 2".

Send for complete Catalog and sample of the new LAUGHLIN "Safety" Wire Rope Clip, which marks a great advance in clip design.

THE THOMAS LAUGHLIN CO
PORTLAND • MAINE

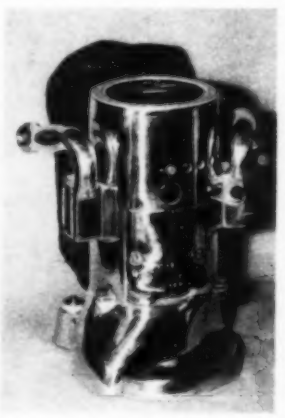


when forms are stripped, by driving spacer back from surface with nail set. This causes washer to drop off end and remainder of rod can be driven out with short piece of wire.—**Neptune Mfg. Co., 117 East 23rd St., Los Angeles, Calif.**

"CUSHIONED-AIR" PAVING BREAKER has new type of piston which makes hammer easier to hold especially at higher air pressures. At no time, manufacturers claim, can piston strike fronthead whether machine is operating or idling. Front end of paving breaker provided with air cushion which absorbs blow of piston when steel is not in contact

with work, eliminating breakage of parts from shock. Valve provides auxiliary exhaust for front cylinder and is said to give machine greater power without extra demand on air line. Cylinder contains extra large reservoir which holds sufficient oil to insure adequate lubrication. Longer anvil block bearing insures correct alignment and long life. Strongly built springs prevent overstressing of front-head bolts. Patented, reverse buttress, self-locking threads on latch, lever bolt of steel retainer assure sufficient tightness without overstressing bolt. Net weight, 128 lb.—**Ingersoll-Rand Co., 11 Broadway, New York City.**

ROTARY EDGER, available in 7- and 8-in. sizes, is said to provide enough power to maintain full speed of sanding disk and vacuum fan under severe loads. Scientifically designed intake which extends around three-quarters of sanding disk leads dust into chamber where every particle is picked up and deposited in bag by large fan which runs at speed of 12,000 to 15,000 r.p.m. Quiet running helical cut gears. Well balanced revolving parts and bearings 50 per cent larger than usual said to make model quiet, smooth running machine, despite fact that sanding disk is operating at speed of 3,000 r.p.m.



Other features: Large, easy grip handles; flat top of edger permits operator to stand machine on head (convenient when changing sanding disks); built-in floodlight which brightly illuminates working area; independent light switch; adjustable caster in rear designed to prevent electric cable from getting under machine; detachable cord.—**Porter-Cable Machine Co., Syracuse, N. Y.**

"I'D HATE TO LET MY BEARD GROW 'TIL THAT ENGINE QUITS!" SAYS ENGINEER C. W. HAM

"IT WAS A GOOD ENGINE IN THE FIRST PLACE," says Mr. C. W. Ham, Diesel Engineer for Western Engine Corporation. "We built it ourselves and put it in operation in 1926. It's a stationary solid-injection engine that furnishes us power in rush times 24 hours a day and during its life has never let us down.

"It's still in good shape and produces power for our entire plant at less than the low city rate we could get.

"But the best engine ever built needs good fuel and lubrication. Every drop of oil this one ever had in the crankcase has been your Shell Talpa Oil. Every drop of fuel that's gone through it has been 'Shell Dieseline.' I don't know how *any* products could beat this perfect record regardless of price."

* * *

Shell appreciates Mr. Ham's bouquets and is proud to have shared in this record. And while we might add that Shell products can't make bad equipment into good equipment, we do believe they will do the best job that can be done in making any kind of equipment run better and last longer.

Experienced technical men are on call without obligation on all industrial lubrication and fuel problems.

SHELL

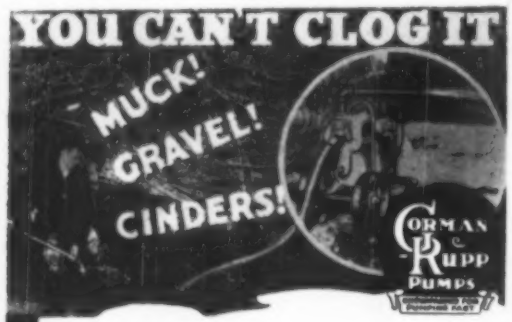
SHELL INDUSTRIAL LUBRICANTS

B-G CONVEYORS

BARBER-GREENE Bucket Loaders offer by far the cheapest means of loading bulk materials from ground storage to trucks. They may be equipped with a vibrating screen as shown here, loading and screening simultaneously. This Barber-Greene has many distinctive advantages which deserve your investigation.

BARBER GREENE
AURORA, ILLINOIS

Q-2



"Old Faithful" that's what construction and maintenance men everywhere call their G & R self-priming centrifugal pumps. Fool proof because they're gadget-less. They've got something the others haven't—simplicity. They can't clog—they're not quitters.

The only pumps with renewable wearing plate — they're modern.

G & R's will deliver more water per hour and pump more hours at less cost — under any conditions.

WE WILL SHIP YOU ONE
and LET YOU BE THE JUDGE!

You'll find them
THE MOST DEPENDABLE PUMPS FOR THE LEAST MONEY
...bar none

PROMPT DELIVERY ... from Stock in 100 Principal Cities

WRITE

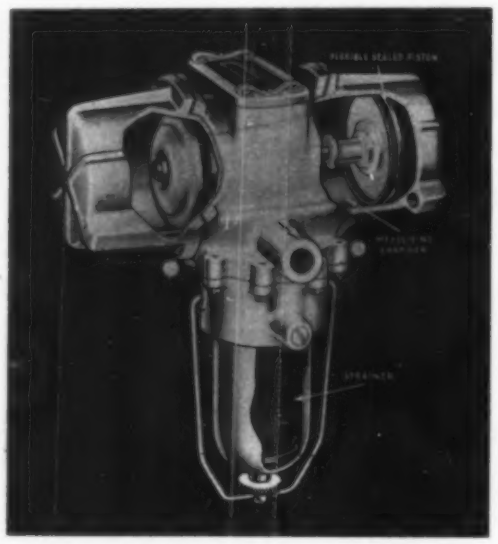
THE GORMAN-RUPP CO., Mansfield, Ohio

DROP BOTTOM FULL REVOLVING BASEMENT HOE has casting radius of 25 ft. and truck loading radius of 15 ft. Said to be cheap and fast machine for basement digging. Has been designed to dig straighter, more accurate side walls, smoother solid floors and to reduce hand work to minimum. Bucket

described as wide and shallow, filling easily and handling ½ yd., or more. Electrically tripped drop bottom facilitates truck loading. Earth discharged quickly and door is properly balanced so that it may be closed easily. Flat bucket door makes it possible to dig level basement floor without gouging holes which must later be filled by hand. Straight sides are fitted with knife-like side cutters which leaves smooth straight wall. Machine eliminates necessity for ramps and backfilling as all its work is done on top of ground. — **Insley Mfg. Corp., Indianapolis, Ind.**

CONCRETE FLOOR PAINT, called "Luminall Cement Floor Paint," has binder of synthetic (alkyd) resin and casein with high metallic oxide pigment. Said to have tenacious bonding power, extremely easy application, high coverage per gallon, and to retain elasticity which gives it longer life. Does not chip, flake, alligator or powder off. Comes in paste form and thins with water. — **National Chemical & Mfg. Co., 3617 S. May St., Chicago, Ill.**

FOR CHECKING FUEL CONSUMPTION of trucks, buses, taxicabs, small marine craft, tractors, industrial engines and other equipment, measuring and recording system called Akraflo and consisting of positive displacement meter and recording dial has



been devised. Built-in strainer prevents grit and sand from entering meter; air separator keeps air from reaching meter, eliminating cause of inaccurate measurement. Will measure flow rates from ½ to 20 gal. per hour. Operates on pressure of 1 lb. per square inch. Maximum operating pressure, 5 lb. Dial built integral with meter indicates 1/10 to 10,000 gal. Where direct meter readings are not possible, there is available remote dial electrically driven by battery through contact mechanism in meter. — **S. F. Bowser & Co., Inc., Fort Wayne, Ind.**

HERCULES-DUMP BODIES

Years Ahead on Every Count!

1. Center-Lift, Super-Power Hydraulic Hoist.
2. "Tire-Tool" Pack Dump Bodies — a spacious weather and theft-proof compartment built-in under body.
3. "Eze-Reach" Tail Gate Control Lever — mounted on hoist frame within easy reach at all times.
4. "Button-ease" control, on dash, operates Power Take-Off.
5. "Button-ease" control, on floor, operates Hydraulic Hoist — OUT OF THE WAY BUT HANDY.

NOT ONE of these features are offered by any other manufacturer — with Hercules you get them all.

Write for literature.

HERCULES STEEL PRODUCTS CO.
GALION, OHIO U S A

Does This STOP You?

If this attracts your attention stop and think of the other readers who will also stop and read it. If a product of yours were substituted and your name and address were added this space would be something that your salesmen could capitalize. There are hundreds and hundreds of signatures in *Construction Methods & Equipment* files that prove unquestionably that these advertising pages receive a lot of attention.

• • •

CHEMICALLY DIFFERENT LUBRICATING OIL REMOVES CARBON; HAS STRONGER NATURAL FILM

LION Naturalube

MOTOR OIL AND DIESEL ENGINE OIL

CONSERVE POWER AND LOWER FUEL CONSUMPTION BY REMOVING HARD CARBON—STRONGER NATURAL FILMS SAVE WEAR

Performance tests by contractors prove that Naturalube restores power—saves fuel—and saves wear in all types of internal combustion engines. In comparative laboratory wear tests 33 1-3% to 116% more wear occurred when using other type oils than when using Naturalube.

The unusual properties of this new type oil: a stronger natural protective oil film and the ability to gradually remove hard carbon deposits from pistons, rings, valves and spark plugs insure longer periods of continuous trouble-free engine operation.

For trouble-free engine operation at a savings switch to Lion Naturalube Motor Oil or Lion Naturalube Diesel Engine Oil.

For visible and understandable proof of Naturalube's money-saving features and details of money-back guarantee, phone or write the nearest Naturalube distributor or write Lion Oil Refining Company, El Dorado, Arkansas.

LION OIL REFINING COMPANY
EL DORADO . . . . ARKANSAS

LION Naturalube

LION PETROLEUM PRODUCTS

THE SAFE OIL FOR ALL INTERNAL COMBUSTION ENGINES

The Years Have Proven the Dependability of

SYNTRON

ELECTRIC TOOLS

as well as their Money Saving Ability!

Electro-Magnet

ELECTRIC HAMMERS

In 6 Sizes

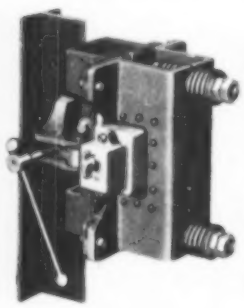
For Drilling — Cutting — Surfacing Concrete — For Vibrating Forms — For Pointing Brick — and for a dozen other jobs.

Overpowered

ELECTRIC SAWS

In 5 Models — 2" to 4¾" Cuts

With tilting bases for bevel cuts. Also with abrasive discs for tile, etc.



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(Electric)

For Wall Forms — Tunnel Linings — and Precast Products — Pipe, Etc.

INTERNAL CONCRETE VIBRATORS

Both Electric Motor and Gas Engine Driven 6500 to 9000 V. P. M.

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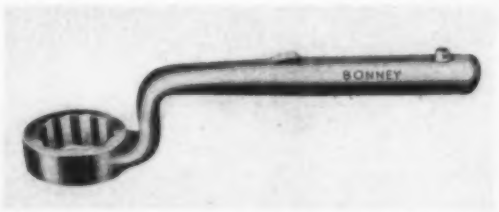
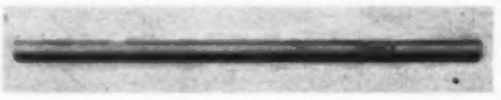
HEAVY-DUTY BOX WRENCHES made in both double-offset and 15-deg. angle types, with interchangeable tubular handles are drop-forged of chrome alloy steel, carefully heat treated and heavily plat-



ed with polished heads. Seven sizes with double hexagon openings ranging from 1⅜ to 2¼ in. Designed to break loose or tighten large diameter nuts with minimum of effort. Especially useful for

work on buses, trucks, tractors, steam shovels and road and industrial machinery. Handle, 30 in. long, made of seamless steel tubing provides extra leverage necessary in turning large nuts. Holes pro-



vided in each end of handle to insure positive locking on the "spring-ball" plunger in end of wrench shank. Both types of wrenches interchangeable in handle, combination of any two making double-end wrench.—**Bonney Forge & Tool Works, Allentown, Pa.**

SMALL, MOTOR-GENERATOR TYPE ARC-WELDER by providing greater convenience and accuracy in welding through self-indicating, dual continuous current control, is expected by its makers to widen application of welding in new fields such as garages, bus and truck fleet repair shops, sheet metal shops, cement plants and metal fabricating shops. Has both job selector and current control calibrated and equipped with dials which indicate type of work and number of amperes for each setting, enabling operator to obtain high quality welds and satisfactory welding speeds because he can vary both slope of volt-ampere curve and amount of welding current to suit job. Both voltage control (job selector) and current control are continuous in

operation, providing various combinations of voltage and current. This feature said to simplify setting of control and accounts for exceptionally wide welding range in types of work; welding conditions, sizes of electrodes and thicknesses of materials. Welding range of 45 to 200 amp. is ample for welding of light- and heavy-gage materials and fits machine for use in sheet metal work, hard facing, pipe welding, cast iron repair and garage operations. Welder can be used either with bare or shielded arc type electrodes. Powered by squirrel-cage, induction type motor. Connections readily accessible either for 220 or 440 v., 3- or 2-phase, 60 or 50 cycles as desired. — **The Lincoln Electric Co., 12818 Coit Rd., Cleveland, Ohio.**

COMBINATION FRICTION AND RUBBER TAPE, known as U. S. Twinsulation Tape, and used for all kinds of electrical and kindred work, is said to combine advantages found both in friction tape and splicing compound. "Because of its high dielectric strength," announcement says, "less tape need be applied than is the case with ordinary commercial friction and rubber tape. In fact, in most cases, less than half the footage is necessary to make a safe splice. A splice made with two plies of Twinsulation tape will withstand a test voltage of approximately 12,500 to 15,000 volts." — **U. S. Rubber Co., 1790 Broadway, New York City.**

DIESEL SIX-CYLINDER CRAWLER TRACTOR for heavy-duty service has maximum belt horsepower of 80 and drawbar horsepower of 70 which, combined with six-speed transmission is said to give operator correct power and speed for all types of jobs. Engine starts on gasoline and after minute or less shifts to full diesel operation. Conventional automotive-type electric starter. Six forward, two reverse speeds: Low gear 1½ m.p.h.; Second, 2 m.p.h.; third, 2½ m.p.h.; fourth, 3¼ m.p.h.; fifth,

4⅝ m.p.h.; high, 5¾ m.p.h.; low reverse 1½ m.p.h.; high reverse, 3¼ m.p.h. Engine, six-cylinder, four-cycle, full diesel type with 4¾-in. bore and 6½-in. stroke, and operating at 1,200 r.p.m. Engine clutch diameter, 17 in. Selective type transmission. Other features: Clutch brake for fast gear shifting; power actuated steering clutches; adjustable steering levers and pedals; special gravity lubrication for track rollers at low speeds and pressure lubrication at high speeds. Tractor available in two treads, narrow tread 62 in. from c. to c. of track, and wide tread 74 in. from c. to c. of track. Length of tracks 84⅜ in. Tractor, 158 in. long. Overall width of wide-tread tractor, 92 in.; of narrow-tread, 82 in. Approximate shipping weight, narrow-tread, 21,500 lb.; wide-tread, 22,000 lb. — **International Harvester Co., 180 N. Michigan Ave., Chicago, Ill.**

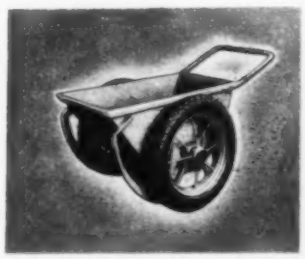
Cut Yardage Costs to the Bone

The ⅜ and ½ Yard Insley Type K Excavators are the answer to the problem of lower yardage costs. Ample power for faster digging and swinging. Sturdily built and easy to handle in close quarters, they are ideal equipment where time and space demand maximum efficiency.

Ask for Bulletin No. 137 for complete specifications. Insley Manufacturing Corp., 801 Olney Street, Indianapolis, Indiana.

ROCKER DUMP HAND CARTS. Pneumatic tires, roller bearings . . . Easy to push . . . Easy to spot the load . . . Dumps clean in one motion . . . Will not roll while in dumping position. Made in 3 sizes, 6, 9, 12 cu. ft.

ROUND-TYPE BUCKETS. Controllable center dump discharge. Grout tight . . . No wearing parts needing frequent replacement. One-half cu. yd. to 8 cu. yd. standard sizes—special heavy-duty Buckets for mass concrete.



The Model "D" Dump Wagon—truly a fit companion to the Type K Excavator in economy and dependability. Semi-trailer, bottom dump, electric door control. Adapted to any standard 1½-ton truck.

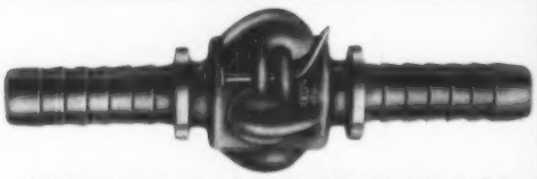
INSLEY

Ever See a Dryer Job?

Pressure Aqueduct — Natick, Mass. Weight of Pipe — 52 tons each

A MORETRENCH WELLPOINT SYSTEM KEEPS IT THAT WAY — DAY IN AND DAY OUT. A time and money saver from any standpoint. Progress always follows Moretrench!

MORETRENCH CORPORATION · 90 West St. · NEW YORK, N. Y.



"AIR KING"

★*Quick-Acting, Universal Type*

HOSE COUPLING

★ A push, a quarter turn, and connection is made! That's one reason why the "AIR KING" is so extensively used on jobs requiring frequent coupling and uncoupling of hose. Another reason is its interchangeable feature . . . permitting coupling of any two sizes of hose within "AIR KING" hose end range, or coupling of hose to any pipe up to 1", by use of threaded connections.

Then, too, there's the *safety* factor. After connection is made, locking ends can be securely anchored together by means of wire, nail or cotter pin through holes provided for this purpose.

There's no doubt about it . . . it will pay you to order "AIR KING" Couplings when you want to insure *uninterrupted service!* Malleable Iron, Style AKM-Bronze, Style AKB.

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"JOINTS IN ROADS"

Living creatures have them —so have material things. Man at first tried to build concrete roads without them and failed. Both contraction and expansion joints are necessary. Command us.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN, OHIO

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

STATIONARY AIR COMPRESSORS—**Schramm, Inc.,** West Chester, Pa. (16 pp., illustrated.) Line of "Utility" stationary air compressors in capacities from 85 to 600 cu.ft. of free air per minute. Assemblies range from bare compressor to complete air plants with electric motor, air receiver and all fittings. Either V-belt drive or compact built-in direct motor drive can be furnished. Operating data, detailed specifications.

• • •

WHEELBARROWS — **Red Star Products, Inc.,** 12910 Taft Ave., Cleveland, Ohio. (4-p. folder, illustrated.) Various models of wheelbarrow with pneumatic-tired disk wheels, plain disk wheels and steel spoke wheels. Interchangeable trays fit either wood frame or pipe frame models. Barrow is designed so that 85 per cent of the load is on the wheel. Curved leg brace prevents barking shins of operator. Specifications for all models in tabular form.

• • •

STAINLESS STEEL WELDING ELECTRODES — **The McKay Co.,** York, Pa. (16 pp., illustrated.) Line of stainless steel electrodes of various chemical analyses for welding, packaged with a certification by the manufacturer of weld deposit analysis rather than the wire analysis. Advantages claimed include: Instant contact upon restriking arc; maximum ease of slag removal; spatter free; smooth bead; all alloys contained in core wire.

• • •

SUBDRAINAGE PRODUCTS — **Toncan Culvert Manufacturers' Association,** Republic Building, Cleveland, Ohio. (32 pp., illustrated.) Corrugated metal pipe, either perforated or non-perforated, sectional plate pipe in diameters from 60 to 210 in., sectional plate arches for small bridge construction and Tyton flood gates. Chapters of booklet deal with ground water and subdrains, methods of constructing subdrains, types of drainage installations, requirements of subdrainage pipe and suggested specifications for subdrainage pipe.

• • •

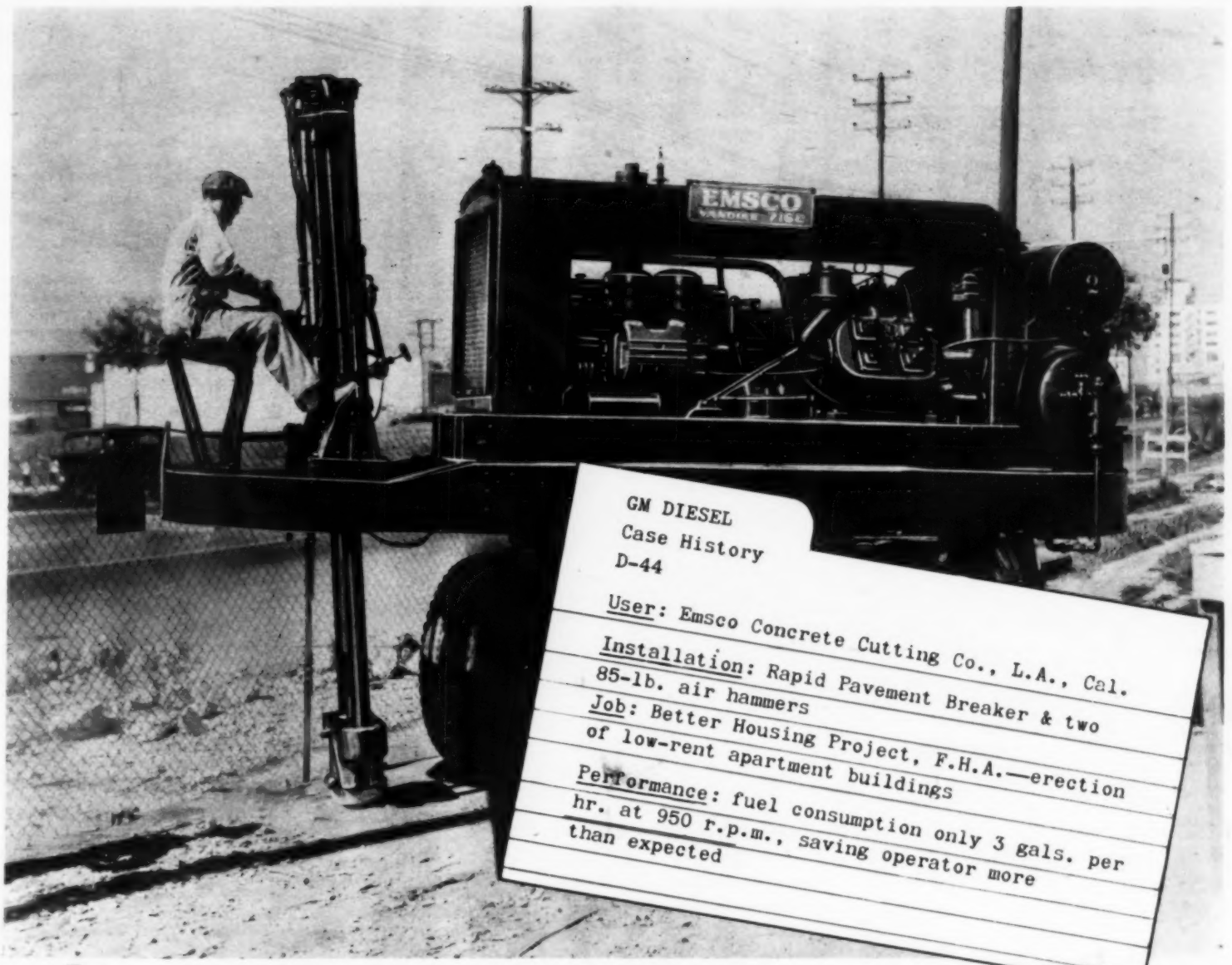
FIBER BOARD ROOF SURFACING — **The Celotex Corp.,** 919 N. Michigan Ave., Chicago, Ill. (4-p. folder, illustrated.) Describes and illustrates applications of Traffic-Top, a fiber board saturated with asphalt, for transforming unused flat roofs into recreational areas. Material is waterproof, resilient and colorful (red, green and black). Sizes of panels 12x24 in. and 24x48 in., thicknesses ¼ and ½ in. Specially adapted to roofs of apartment houses, hotels, schools, hospitals and factories.

• • •

RUST-RESISTING IRON PIPE—**Republic Steel Corp.,** Cleveland, Ohio (45 pp., illustrated.) Presents the story of Toncan copper molybdenum iron pipe for "tough service." Subjects covered include the electric weld process of manufacture; rust and corrosion resistance; recommended applications; details of tests; physical properties; threading procedure; welding; sizes and weights; outstanding installations and service records in specific fields; how to specify and order.

• • •

ANCHORAGE FOR BOLTS AND SCREWS — **Rawlplug Co., Inc.,** 98 Lafayette St., New York, N. Y. (37 pp., vest-pocket size, illustrated.) Plug for screw anchor is of twisted jute fibre which is inserted into hole in masonry and compressed when screw enters, insuring firm grip. For bolt anchor, ductile zinc alloy collar collapses when struck with calking hammer, causing expansion of lead ring for tight fit. Details, also, on one-piece expansion bolts, called Rawl-drives, and three-point masonry drills. Price lists and tables of sizes.


EMSCO
GM DIESEL
Case History
D-44
User: Emsco Concrete Cutting Co., L.A., Cal.
Installation: Rapid Pavement Breaker & two 85-lb. air hammers
Job: Better Housing Project, F.H.A.—erection of low-rent apartment buildings
Performance: fuel consumption only 3 gals. per hr. at 950 r.p.m., saving operator more than expected

IT'S SMASHING OUT A NEW LOW
IN LOW-RENT HOUSING COSTS!

WITH each pulverizing plunge this pavement breaker makes, the Diesel that drives it is pounding out a record of real significance to contractors and construction engineers.

It's smashing costs way down below rock-bottom limits. And we don't mean fuel costs only. We mean *time, service and maintenance costs as well.*

That's one vital difference the GM Diesel makes.

What's more, you'll find it actually *outperforms* other engines, too—gasoline and steam engines included—even on jobs for which these engines once seemed better suited.

And that's another reason you'll want to check in on this Diesel, whatever doubts you may have had about Diesels of the past.

Ruggedly built on the General Motors 2-cycle principle, it fits about the same space as gasoline engines of comparable horsepower—is simpler, if anything, to operate.

GM DIESEL POWER

Equipped with a highly efficient Unit Injector and Fuel Pump and improved Uniflow Blower Scavenging—it assures peak performance on almost any of the commercially available fuels and lubricants, responds to variable load demands with new alertness, yet "holds on" like a steam engine.

And since all its wearing parts are standardized for ready replacement, it can be kept in service indefinitely without need of expert attention.

For full details of the GM Packaged Power units available for both portable and stationary work—completely engineered units from 15 hp. up that come all set to go—write for name and address of your nearest GM Diesel dealer.

DIESEL ENGINE DIVISION
GENERAL MOTORS SALES CORPORATION
CLEVELAND, OHIO

☆ GENERAL MOTORS DIESEL ☆

SEE THE GENERAL MOTORS DIESEL EXHIBITS AT THE NEW YORK AND SAN FRANCISCO FAIRS

The ⅜ yard Hi-Power is a bucket the truck crane man swears by — for speed, digging power and yardage. Let us quote you prices on any size from ⅜ yard up.

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ACCURATE Proportioning, Thorough Mixing, High Capacity, and Versatility are simply the A, B, C of the Barber-Greene Bituminous Mixer. You should know its many outstanding advantages. Write for catalog. There is no obligation.

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AURORA, ILLINOIS

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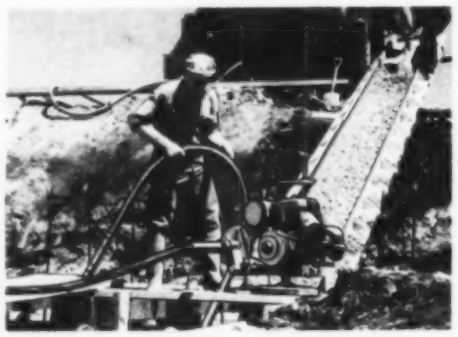
GET BETTER CONCRETE WITH *Mall* VIBRATORS



MALL 7000 r.p.m. gas engine vibrator on low round base. Can also be furnished with pneumatic wheel mounting and attachments for CONCRETE SURFACING, PUMPING, SAWING, DRILLING, SANDING and GRINDING

You save on cement by using more coarse aggregate and on labor by using fewer puddlers. One vibrator does the work of three or four men. A MALL vibrator pays for itself with these savings. At the same time you get stronger, denser and more durable concrete, a better bond between reinforcing steel and successive layers, and earlier finishing with a minimum of patching.

There is a MALL for every type of structure. We will gladly help you select the unit best suited for your job — no cost or obligation!

MALL TOOL COMPANY
1753 SOUTH CHICAGO AVENUE CHICAGO ILLINOIS

IRRIGATION DITCH EXCAVATOR — **Bucyrus-Erie Co.**, South Milwaukee, Wis. (20 pp., illustrated.) Explains how costs of constructing and cleaning irrigation and drainage ditches can be reduced with the Bucyrus-Ruth excavator. This machine, powered by a gasoline engine, consists of a digging ladder and an endless chain of self-cleaning buckets mounted upon an adjustable carriage with crawler tracks. Among operations which the excavator can handle are: cleaning bottom and sides of flat-bottom ditch; cleaning round-bottom ditch in one operation; building up banks; cleaning slopes of large canals; cleaning channel in middle of drainage ditch; constructing new ditches below or above ground level.

• • •

VIBRATORY PAVING TUBE—**Jackson Vibrators, Inc.**, Ludington, Mich. (10 pp., illustrated.) Full-width concrete pavement internal vibrator, designed for attachment to finishing machine. Single-tube unit for widths from 10 to 14 ft. and double-tube units for widths from 18 to 28 ft. Mechanical parts of vibrator include suspension carriage with push rods, attaching brackets, hydraulic lifting ram, automatic motor switch, tube and suspension brackets, heavy-duty motors, power unit and generator. Designed to handle coarse, dry mixes. Complete paving tube assembly is carried independently of the finisher on two flanged wheels.

• • •

PORTABLE ELECTRIC TOOLS — **Independent Pneumatic Tool Co.**, 278 S. Jefferson St., Chicago, Ill. (48 pp., illustrated.) This catalog, which is divided into four major sections, gives complete descriptions, specifications and prices on the entire Thor line of universal type electric drills, drill stands, screw drivers, nut setters, tappers, saws, hammers, grinders, polishers, sanders, heat guns and electric tool accessories. Also shown are a wide variety of attachments available for use with Thor screw drivers and nut setters. These include angle attachments for operation in hard-to-reach places, attachments for driving screws and nuts to predetermined tensions and so on. Profusely illustrated with pictures of tools in operation on various types of work, as well as with pictures of the individual tools, the book is designed as a helpful guide for the user of electric tools.

• • •

POWER TRANSMISSION — **Link Belt Co.**, 307 North Michigan Ave., Chicago, Ill. (272 pp., illustrated.) A new handbook of modern power transmission units, containing complete design and application data, dimensions, weights, list prices, cross-indexed for the convenient use of design engineers and plant managers. Included in the book are Link-Belt Shafer self-cligning ball and roller bearing units, newly designed for greater life; unmounted radial-thrust bearings; babbitted bearing units take-ups; friction and jaw clutches, including the newly-acquired Twin Disc line; cast and cut tooth gearing; pulleys; safety collars; shafting; shaft couplings; drop hangers; welded steel base plates, etc.

• • •

REHANDLING BUCKETS — **The Hayward Co.**, 50 Church St., New York, N. Y. (8 pp., illustrated.) Suggestions for rehandling bulk materials such as sand, gravel and crushed stone with Class E-16 clamshell buckets in sizes from ½ to 4 cu.yd. Other buckets have manganese steel teeth for digging light materials. Buckets have power-wheel type of closing device and one-piece alloy steel shells. Diagonal truss braces keep shells in line.

• • •

MOTOR GRADER — **J. D. Adams Co.**, Indianapolis, Ind. (8 pp. illustrated.) Small low-priced unit powered by four-cylinder 22½-hp. gasoline engine and equipped with special rear drive. For road maintenance, grading, clearing snow removal from city streets. Standard equipment includes 9-ft. blade, 6x20 balloon type tires. Approximate weight, 8,200 lb. Handwheel controls for shifting blade. All-welded construction. Pamphlet contains detailed specifications.

Things Are Moving Ahead!

Baker Hydraulic Bulldozers and Gradebuilders are doing most of the moving these days — for good and sufficient reasons.

Baker Excavator type Bulldozer moving slag at big strip mine.

Your earth-moving is important enough to justify the use of the most efficient Bulldozers and Gradebuilders. Earth-movers everywhere have found this out, judging by the outstanding preference for Bakers on all kinds of construction and material handling jobs.

Tremendous down-pressure, patented twin-cylinder operation, responsive hydraulic blade control and bull-dog strength are a few of the many features that make Bakers supreme. The mold-boards on all models are convertible making them dual-purpose machines ready for any kind of job.

Experience new thrills in Bulldozer performance by putting Bakers on the job.

Ask for Bulletin 803A on Baker Bulldozers and Gradebuilders. Also special bulletins on any of the many Baker Products.

— and Baker Hydraulic Scrapers

They're putting new life into earth-moving jobs. Bigger loads with less power — smooth, even cuts — clean dumping — even spreading — efficient hydraulic control — everything you need to make your earth-moving pay and pay well. Baker Scrapers are built in 3, 5, 8, and 10 cu. yd. capacities for tractors of 25 H. P. up.

With The Flat Digging Angle

Moving heaps of dirt in Cass County, Ill. with Baker 5-yard Hydraulic Scrapers.

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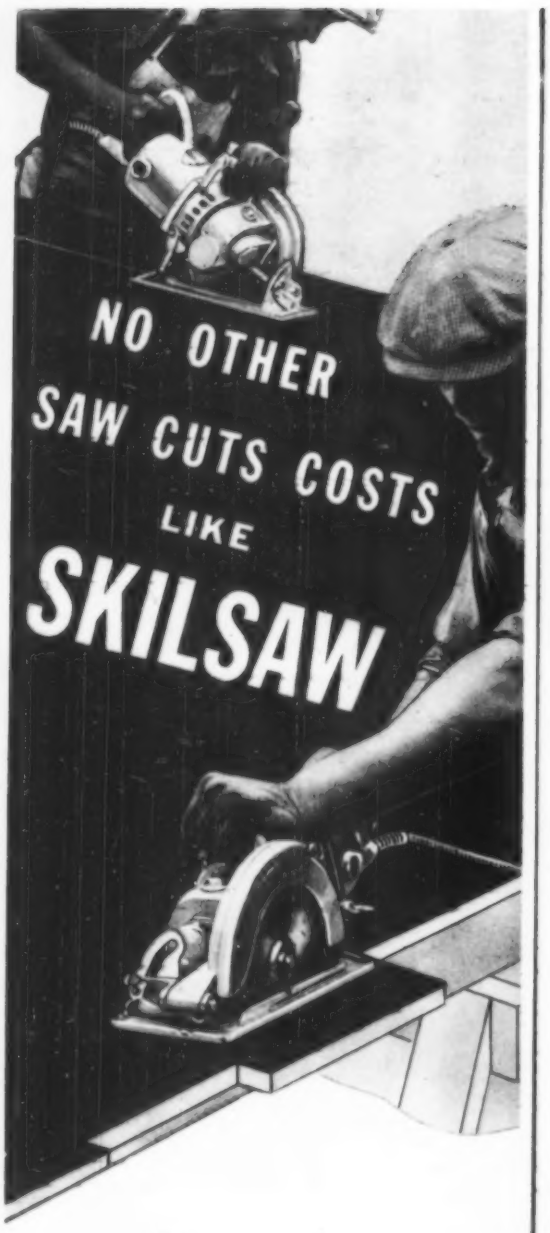

No other saw can give you the power and speed of a Modern SKILSAW . . . because no other saw has the background of 19 years of constant improvement that has made the original electric handsaw THE BEST on the market today! SKILSAW out-performs all others on any kind of sawing job — it saws faster and deeper . . . it saves time and labor costs on every cut you need!

Modern SKILSAW is *more for your money* and will *make more for you* . . . on the first job and on all the jobs for years to come!

9 Powerful Models for Wood, Metal, Stone and Compositions

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PORTABLE ELECTRIC TOOLS
SAVE MONEY IN EVERY OPERATION
SAWS · DRILLS · BELT SANDERS · DISC SANDERS · GRINDERS · BLOWERS
Sold by leading distributors of mine, mill, hardware and contractors' supplies.

TRACTORS, ROAD MACHINES, DIESEL ENGINES — **Caterpillar Tractor Co.,** Peoria, Ill. (31 pp., illustrated.) Composite catalog covering entire Caterpillar line of tractors, road machines and diesel engines. Brief specifications and operating data for each machine, including track-type tractors, auto patrol and blade graders, elevating graders, terracers, diesel engines and diesel-electric generator sets. Diesel units are equipped with independent gasoline starting engines. Graders have wide range of blade positions; power or hand control. Diesel industrial engines are built in range of sizes from 4-in.-diameter smooth furnished steel tubing with

• • •

ROCK CRUSHERS — **Universal Crusher Co.,** Cedar Rapids, Ia. (12 pp., illustrated.) Jaw type rock crushers in full range of sizes; gravel plants of portable and semi-portable design for crushing, screening, mixing and loading; quarry plants; portable crusher units, with capacities from 60 to 400 tons daily; and accessory equipment, including feeders, screens, conveyors, bucket elevators and bins.

• • •

STRUCTURAL INSULATING SLABS—**Celotex Corp.,** 919 North Michigan Ave., Chicago, Ill., (12 pp., illustrated.) Thermax structural insulation, a modern building material combines structural strength, decorative qualities, thermal insulation value, and sound quieting properties in one product. Sound quieting and thermal properties are described fully, and a table of noise reduction coefficients is given in addition to a table showing the result of tests of the material's light reflection factors. Diagrams of various construction details and illustrations of outstanding installations are included.

• • •

LAMINATED SHIMS — **Laminated Shim Co.,** 21-86 44th Ave., Long Island City, N. Y. (Folding chart, illustrated.) Chart, with illustrations, indicating wide range of applications of laminated brass shims for mechanical adjustments. Proper thickness of shim is obtained by peeling off laminated strips, each 0.002 or 0.003 in. thick.

• • •

CONCRETE FOR INDUSTRIAL BUILDINGS AND GARAGES — **Portland Cement Association,** 33 West Grand Ave., Chicago, Ill. (40 pp., illustrated). A book to assist designers in planning and constructing safe, serviceable, economical industrial buildings and garages. Details related to the structural layout of factories, such as floors, stairs, walls and roofs, installation of electric circuits, fire resistance requirements, planning for additional stories and extensions, are discussed and fully illustrated by photographs and diagrams. Layout of parking units, framing plans, ramps and other special problems of commercial garage design also are presented.

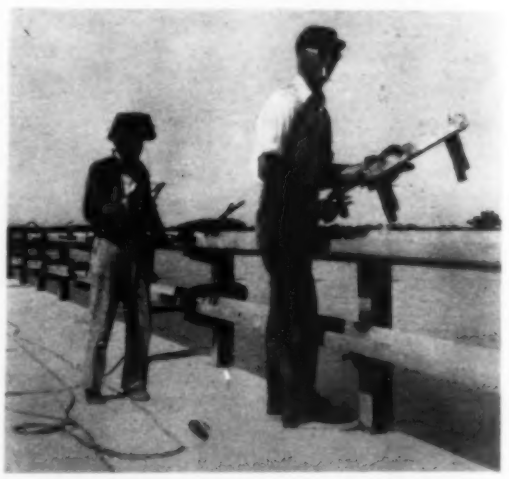
FLORIDA OVERSEAS HIGHWAY

(Continued from page 70)

special cooperation by mailing daily weather reports and advising by telephone of any storm warnings that might affect the area. Three daily weather reports were broadcast by the Miami radio stations. During the course of the work three tropical disturbances were reported and their courses charted but none of them came close enough to cause any concern.

The Labor Problem — Being a PWA project, it was required that all labor be obtained in the local county, which in effect meant Key West, as 95 per cent of the population of Monroe County lives in that city. There never having been any steady program of construction work in Key West few construction men were available, and most of those sent out by the employment office were ex-cigar makers, fishermen, spongers and others unused to heavy work. Also, those on the direct relief rolls were assigned first, and then the non-relief candidates for jobs, which meant that the less capable and less physically fit had to be given a trial first. Most of the labor had to be trained to the work and there was necessarily a large labor turnover at the beginning of the job until a sufficient number of men suitable for this type of work could be broken in to form an efficient organization. In spite of these handicaps, a creditable crew had been built up in a few months.

A slip was dug out near the end of the bridge



CLAMPS HOLD RAIL in place for welding to form highway guard rail.

to accommodate four barges and all materials were delivered from Miami by barge, a tow of about 150 mi. Transportation was a major problem; the Groves Co. alone had to arrange for the delivery of almost 50,000 tons of materials at a time when floating equipment was at a premium due to the requirements of the different contracts under way at the same time. Scheduling mill shipments and reloading materials to barges at Miami so that the materials would arrive on the job as needed, called for considerable study, close attention to job progress and accurate estimating of future needs.

Working hours were set by the PWA at five 8-hr. days per week. A satisfactory arrangement was worked out whereby the work went on for 10 straight days, 5 days the latter part of one week and continuing on through the first 5 days of the following week. This gave the men 4 straight days off out of every two weeks to go home to Key West or Miami. During these 4 days a small crew was held over to take care of any unloading or other work that had to be done. This skeleton crew was made up of men who, for any reason, had not got in their full time.

Preliminary Operations — After setting up the camp, the first work done was to remove the cross-ties from the viaduct and smooth the roadbed so that trucks and equipment could be put on the bridge. A crew was started with two air compressors using air drills and jack-hammers to cut slots in the top of the spandrel walls to receive 12-in. I-beams that projected about 5 ft. on each side to carry the overhanging concrete roadway slabs. The beams were spaced on 8½-ft. centers. The portion of these beams that lay inside the spandrel walls and the fill had a waterproofing treatment consisting of three applications of a special asphalt with two layers of fabric, making up a membrane about ⅛ in. thick. The projecting

(Continued on page 98)

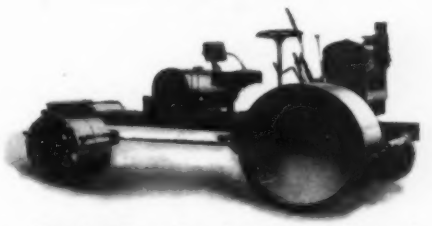
A ROLLER FOR EVERY NEED

FROM THE MOST COMPLETE LINE AVAILABLE TODAY

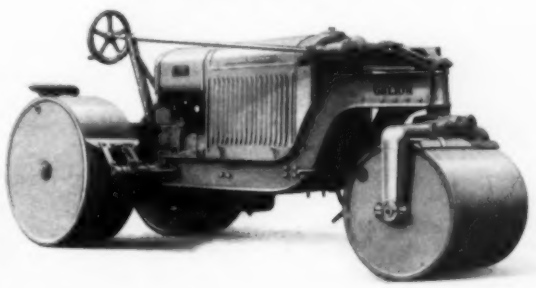
Sheepsfoot rollers — single, double, tandem or any other suitable arrangement desired. Water ballast rolls.

Galion combines efficient engineering with correct design . . . offers the *most complete line of road rollers* to be found anywhere. Galion rollers are a sound investment . . . are flexible and durable units of time-tested design. Each unit is built for a specific job . . . all have the same mechanical excellence and modern developments to provide greater flexibility and smoothness of operation.

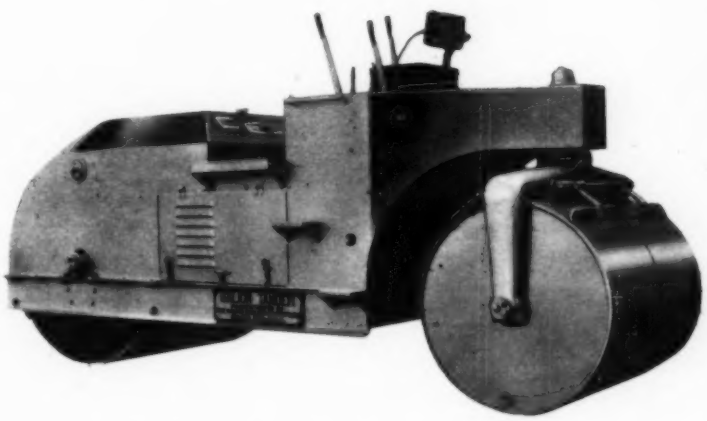
Take advantage of Galion's long experience in building rollers . . . send for literature and engineering data on the roller you need.



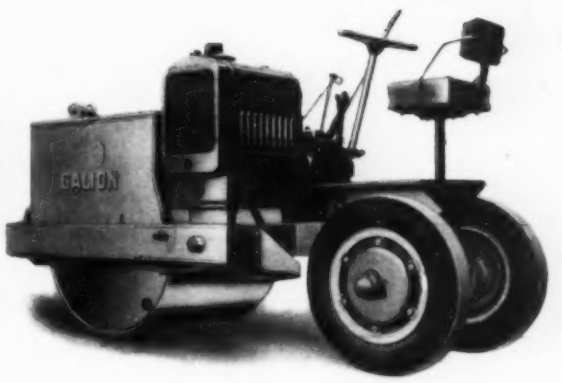
Trench rollers — for close-to-curb rolling and road widening work.



International rollers — a lightweight inexpensive roller variable in weight by water ballast in rolls from 4 to 5 tons. International 1-30 tractor unit.



Tandem rollers — in a range of sizes from 5 tons for the smaller model to 14 tons for the larger models. Weight is variable by adding water to rolls. Gasoline or diesel power.



Portable rollers — for patch material, drives, lawns, etc. Has variable weight up to 9300 lbs. by adding water to compression roll. Easily and quickly attached to truck for transporting.

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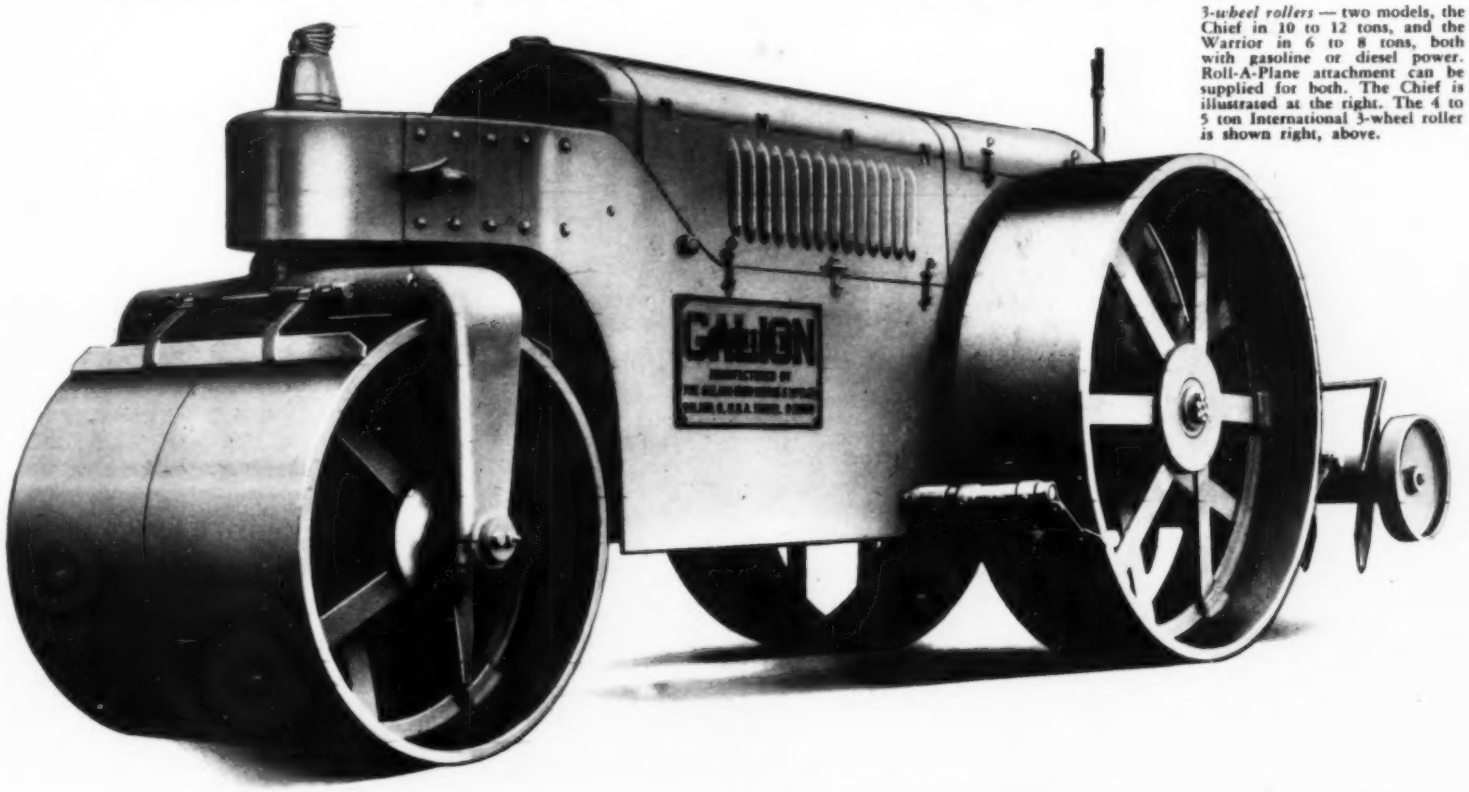
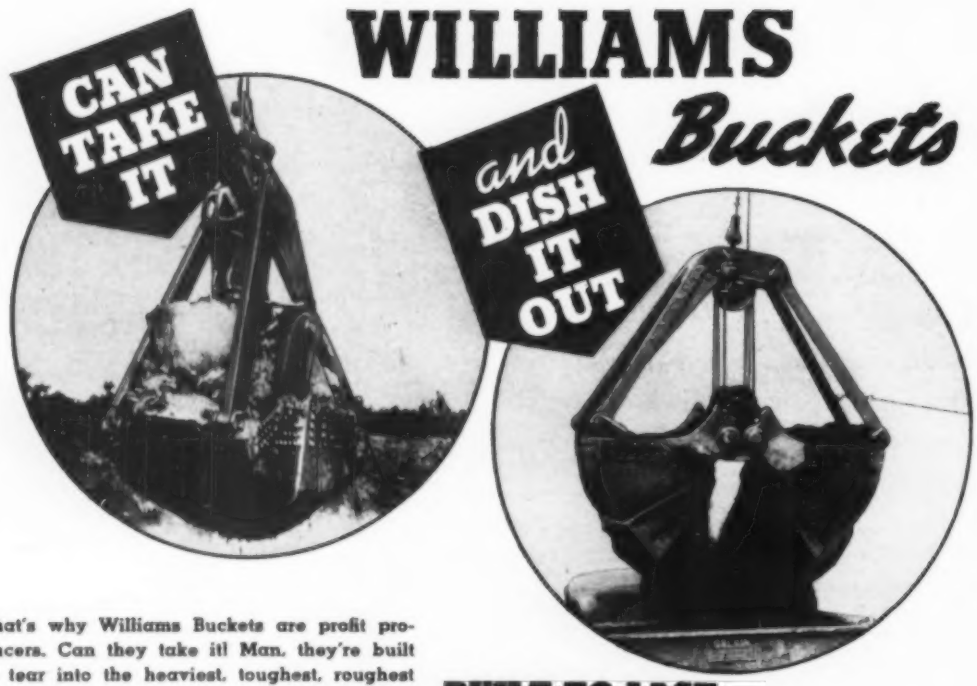
Main Office and Works: **Galion, Ohio** ***Export Division:*** **Columbus, Ohio**



3-wheel rollers — two models, the Chief in 10 to 12 tons, and the Warrior in 6 to 8 tons, both with gasoline or diesel power. Roll-A-Plane attachment can be supplied for both. The Chief is illustrated at the right. The 4 to 5 ton International 3-wheel roller is shown right, above.



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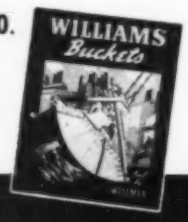
BUILT TO LAST . . .
and MOVE DIRT FAST!

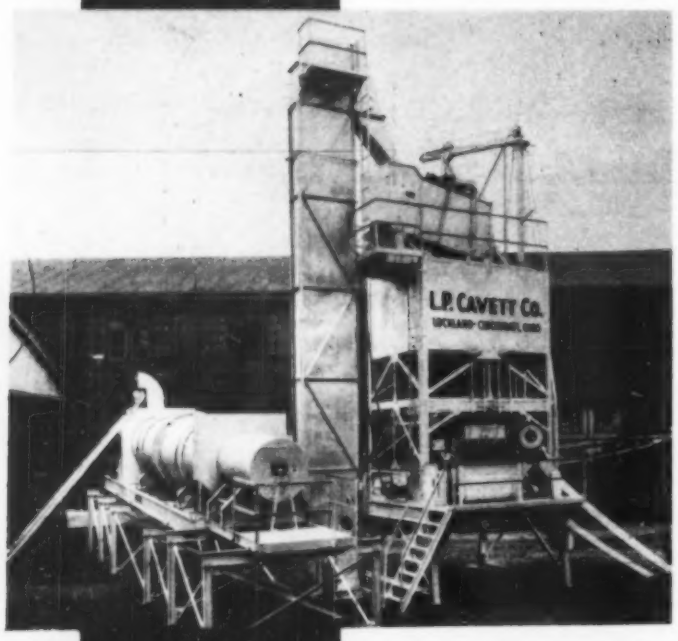
. . . and if that's what you want in a bucket, you'll find your particular type in the Williams Catalog. It's free!

THE WELLMAN ENGINEERING CO.
7017 Central Ave., Cleveland, Ohio



Send for Catalog. Distributors located in all parts of the Country represent the Williams Line of Power-Arm, Multiple Rope, Power-Wheel, Single Line, Hook-On and Dragline Buckets.

built by WELLMAN



MODEL P-A PLANTS ARE BUILT IN 4 SIZES

MODEL PA-15
1500 = Mixer
MODEL PA-20
2000 = Mixer
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in completely assembled sectional units easily moved by truck or rail and quickly erected without the use of a crane or gin pole.

Patents applied for — Built in 4 Sizes

Write for Bulletin T-260

HETHERINGTON & BERNER, INC.
701-745 Kentucky Avenue — Indianapolis, Ind.

(Continued from page 96)

part of the beams was given two coats of red lead and two coats of aluminum paint. These beams were shipped from the mill unpainted and had to be sandblasted before waterproofing.

On the bridge the beams were set into the slots by a truck-mounted Universal crane. Every effort was made to maintain an accurate spacing on the beams in order that the bottom forms would work repeatedly with no alterations. All travel on the bridge had to be in one direction at a time, with no passing or turning around until the beams could be concreted in and a temporary deck put on the projecting ends of a few of the beams to make a passing point.

It was necessary to set up a small mixing plant on a barge to repour the slots around the beams. This was because the narrow roadbed had to be kept open in order to deliver the beams on the bridge. It must be borne in mind that access to this portion of the bridge was only from the one end, as the other end of the arch type construction joined immediately on to the 5 mi. of girder type construction which was incomplete, working from the other end.

Forms for Concrete Deck Slab — Wooden bottom forms were used between the projecting ends of the beams, wedged up under the upper flanges of the beams and extending about 2 ft. past the ends of the beams to form a catwalk outside the curb forms. These panels were made up in the yard where a complete carpenter shop was set up. Enough bottom forms were made to take care of 3,000 ft. of bridge, both sides. These forms were used six times in the course of the work. All bottom forms were left in place for 14 days and, for stripping, a traveler was used, running on pneumatic tires just inside the curbs and carrying overhanging platforms on each side. In the center of the roadway clearance was provided under the traveler for the passage of trucks and equipment. At the same time the bottom forms were set the rail posts were bolted to the ends of the beams using special rivet type bolts.

The concrete slabs for widening the viaduct covered the top of the spandrel wall and extended to the ends of the beams; with construction joints at the center of every beam and expansion joints on every fifth beam. Steel forms for the widening slabs were designed by the manufacturers for pouring alternate slabs but were changed on the job to permit a continuous pour. A pouring schedule of 260 bridge-ft. a day both sides was maintained throughout, using a Rex 27E paver dumping directly into the forms and served by batch-trucks loaded at the batch plant in the yard. Enough steel forms were bought to take care of two days' pour but, as it was impossible to bring forms past the mixer and pouring crew without retarding the work, a night crew was put on to strip and clean the steel forms poured that day and bring them ahead and lay them in place for the next day's setting. Curing was by wet burlap on the curbs and ponding on the slabs. Salt water was used for all mixing and curing.

As soon as concreting was finished on the arch type portion of the 7-mi. bridge 8-in. limerock roadway base was laid in the center strip. Natural key coral rock was used. This material, when broken up by blasting and proper rolling and scarifying in the course of construction, forms a dense, bonded base and when protected with a suitable surface treatment gives a highly satisfactory roadway, both from the viewpoint of riding

(Continued on page 100)

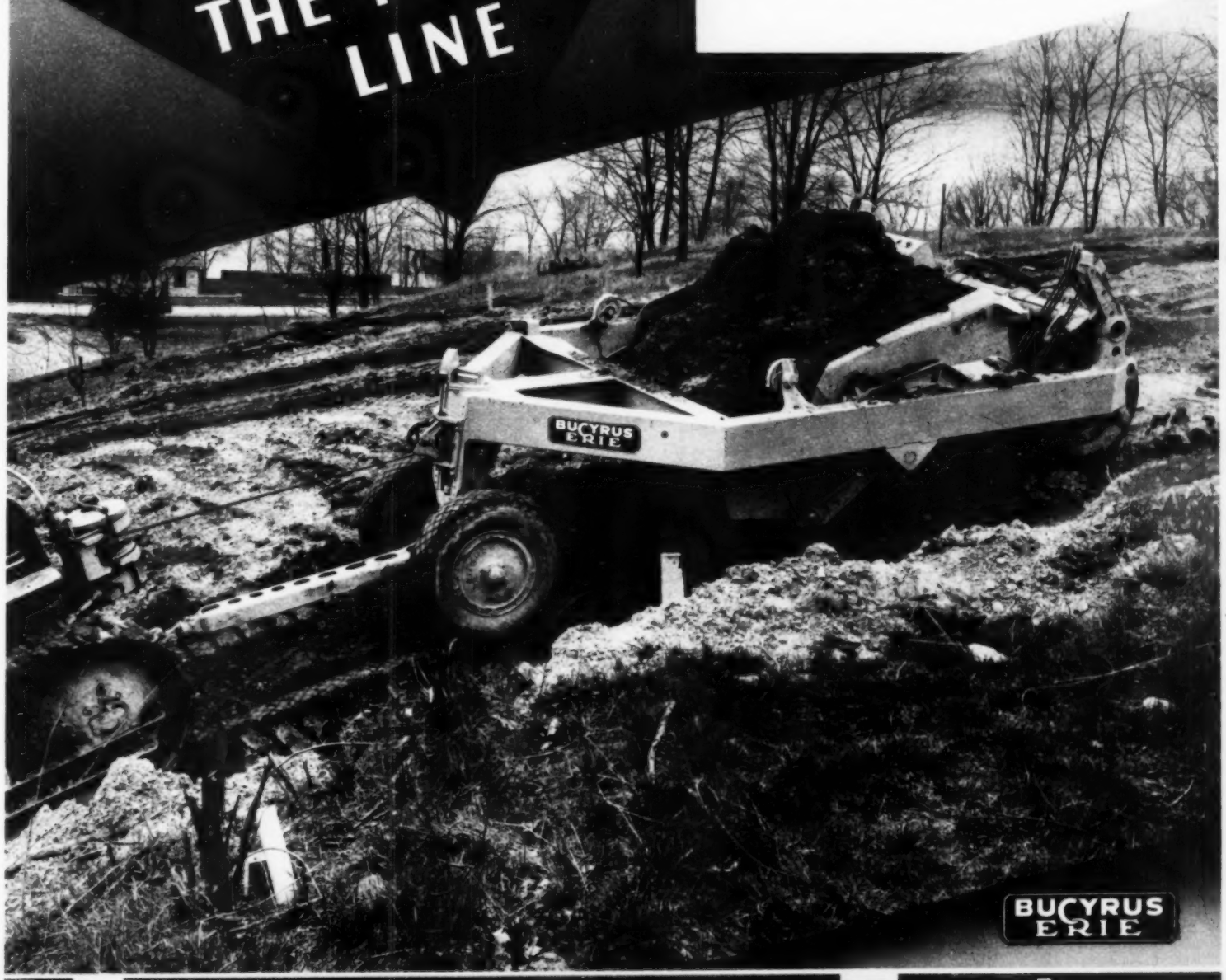
BUCYRUS-ERIE SCRAPERS FILL *Above* THE PROFIT LINE

Up at the top, above the profit line—that's where Bucyrus-Erie Scrapers put the dirt. With the double curved cutting edge, these Scrapers load both the apron and the bowl from the cutting edge. Dirt boils up there to heaping loads, topped with money-making crowns of pay dirt.

The crown is sheer profit dirt, for it doesn't take extra tractor horsepower and strain to get it: With the dirt boiling into both bowl and apron, the top of the load comes in easily right from the cutting edge.

Bucyrus-Erie Scrapers are rated actual line of plate struck measure to assure you profits on every job. You can be sure your estimates are right, because these scrapers fill to more than their rated capacity on every load.

See the nearest Industrial Tractor Distributor of International Harvester Co. for further information on how you can get more dirt above the profit line.



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check for **LOADability, HAULability**

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Returns from your trailer investment will be governed by these three performance factors.

It must "LOAD" and "unload" easily. Be strong but light to "HAUL" with comparative ease—and be capable of reliable control and quick stopping in the face of emergencies.

You'll find the required features incorporated to the fullest degree in ROGERS Trailers.

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EXPERIENCE *built it*—**PERFORMANCE** *sold it*

for Safety
Demand these 4 Features

You Get Them in a Simplex Ball Bearing Screw Jack

1. Self-leveling, drop forged, heat treated cap—floats on a chrome-molybdenum ball which reduces friction 88%—prevents jack from "creeping out" from under load.
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4. Malleable iron base or housing, in all popular sizes, resists fracture and breakage.

Simplex Screw Jacks are one of the 217 models of safer, sturdier, more efficient jacks in the complete Simplex Line—quality materials and workmanship in every type and size, quality that has constantly improved for 40 years. Stocked by your supply house.

TEMPLETON, KENLY & CO.
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Better, Safer Construction Jacks Since 1899

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B-G CONVEYORS

BELT Conveyors are recognized as the cheapest means of transporting materials over short distances. In addition to this important feature, Barber-Greene Belt Conveyors have many other advantages. Their Standardized Sectional Construction gives easier, faster erection, more flexibility, prompt shipment from stock, and high resale value. Barber-Greene Belt Conveyors are built for contracting.

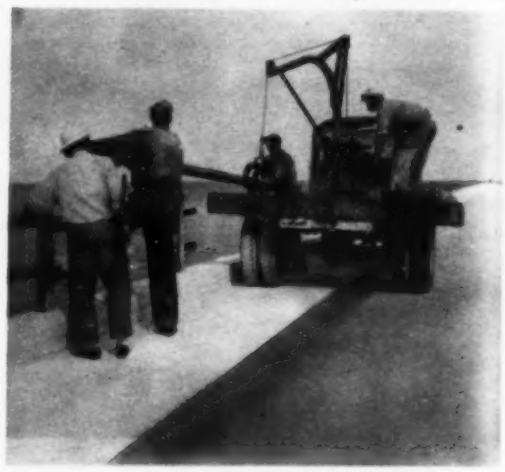
BARBER GREENE
AURORA, ILLINOIS

Q-4

(Continued from page 98)

qualities and economy. For a covering on the base a 1-in. asphaltic retread treatment was used.

Welded Rail Guards — Following the placing of the center roadway strip a crew was started welding up the rail handrail. All of the rail for handrail purposes, including posts, was prepared in Key West, being sandblasted and given one coat of red lead before being loaded on barges for delivery to the job. The rail used was a part of that taken up in removing that portion of the railroad that had not been destroyed by the storm.



CRANE BOOM AND HAND WINCH on truck deliver rail for highway guard rail as CAPT. E. GOEHRING (in white shirt) supervises operations.

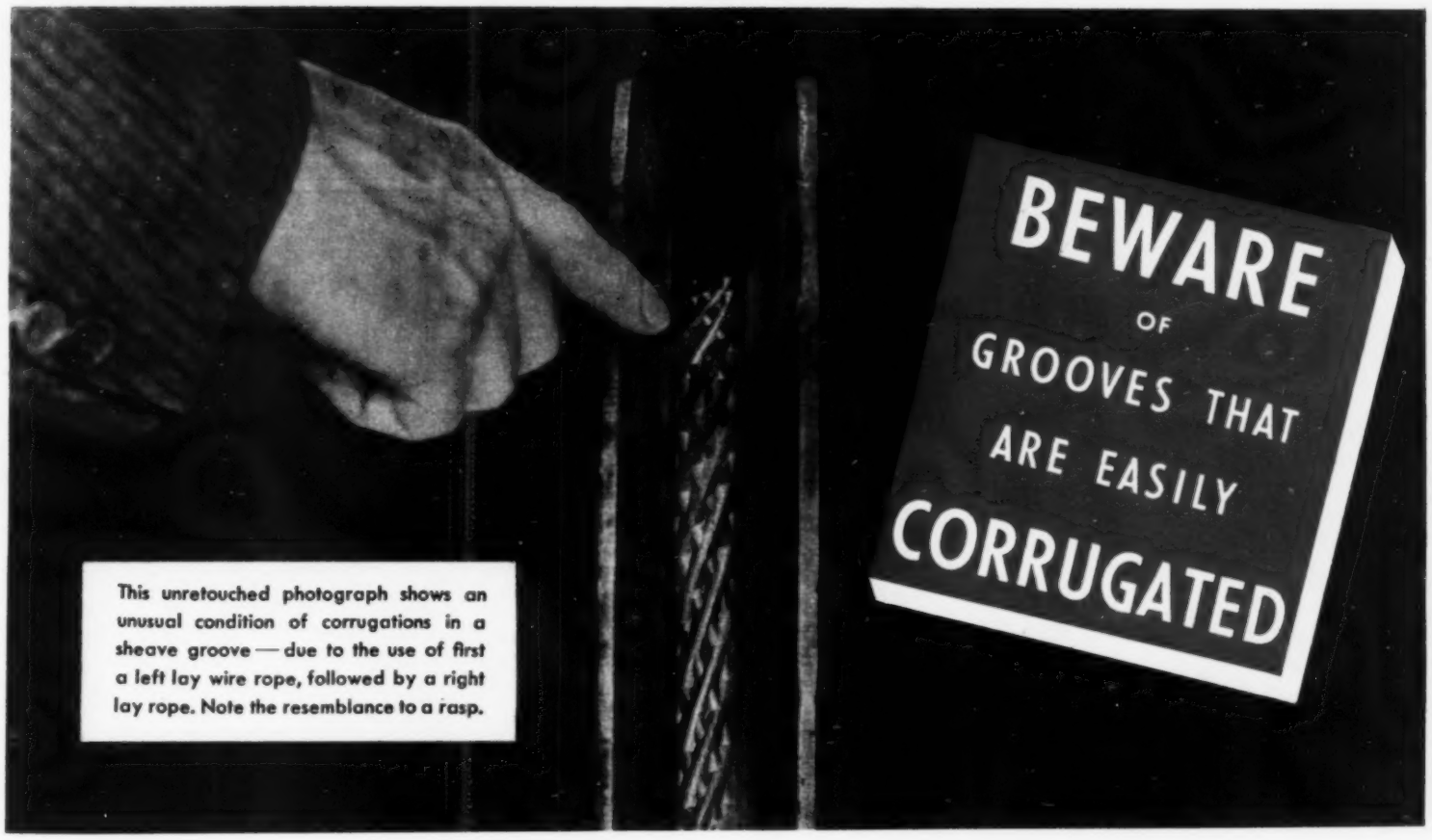
The rail had been salvaged by the Florida East Coast Railway and stored in Key West. Two longitudinal rails were welded to the posts on each side, with gaps left at intervals for expansion. A specially rigged hand crane mounted on a truck was used for distributing and setting the rail. Adjustable steel hangers were made to hang from the tops of the rail posts and hold the rail. When the rails were brought to grade by adjusting the hangers, large C-clamps were used to clamp the rail against the posts. As soon as the rail was tack-welded into place the clamps and hangers were taken down and moved ahead. One welding machine was used for tack welding and three welders followed, completing the welding. In this way about 800 bridge-ft. of railing was completed a day.

Progress and Personnel — Camp and plant erection was started at Duck Key about April 1, 1937 but actual construction was not started until a month later. Work was completed except for final clean up by the end of February, 1938. The job involved waterproofing and setting 1,900 steel beams, averaging setting 50 per 8-hr. day; pouring 7,000 cu.yd. of concrete in widening slabs, averaging 105 cu.yd. per day; placing 700,000 lb. of reinforcing steel; setting 32,000 lin.ft. of rail handrail, averaging 1,600 lin.ft. per day; and laying 20,000 sq.yd. of limerock base and surfacing.

This work was done under the supervision of the Overseas Road and Toll Bridge District, for which B. M. Duncan was chief engineer, with P. L. Hoskins as project engineer. For the S. J. Groves & Sons Co., contractors, P. H. Huntington was general superintendent, with the writer as assistant superintendent in charge of the Duck Key job.

◆

***DETAILS** of other construction features on the Florida Overseas Highway project will appear in forthcoming issues.*



This unretouched photograph shows an unusual condition of corrugations in a sheave groove — due to the use of first a left lay wire rope, followed by a right lay rope. Note the resemblance to a rasp.

Give Your Wire Rope a Fair Chance

While wire rope is made to absorb a lot of wear and tear, the full service of which it is actually capable cannot be had if it is handicapped by poor working conditions. Take, for instance, sheaves and drums. If they are of too small a diameter for the size and construction of rope used . . . if they are made of unsuitable material . . . if the grooves are of improper design or size . . . if sheaves are out of alignment, or if they do not turn freely—shortened rope life is bound to result.

The above illustration shows a sheave made of material too soft to withstand the pressure put on it by the rope. Corrugations such as these, or any corrugations, produce a filing action that no wire rope can withstand for long.

When a new rope is installed on a badly corrugated sheave or drum, its handicap is even greater, for there is almost invariably a difference in the twist of an old rope and a new one—consequently the strands of the new rope will not fit into the old corrugations—which results in such rapid wear on the rope as to become critical in a very short time. When it is not possible to replace a corrugated sheave with one made of proper material, the corrugations should be removed before a new rope is put on.

The proper material to use for sheaves and drums depends on the rope pressure encountered. For example, with a 6 x 19 rope cast iron is satisfactory if the pressure is not greater than 450 lbs. per square inch. Cast steel sheaves or drums are suitable for pressures between 800 and 900 lbs. per square inch. For higher pressures, manganese or chrome steel sheaves are recommended for both safety and long run economy.

This advertisement is published for the purpose of helping all wire-rope users obtain safer and more economical service from their wire rope

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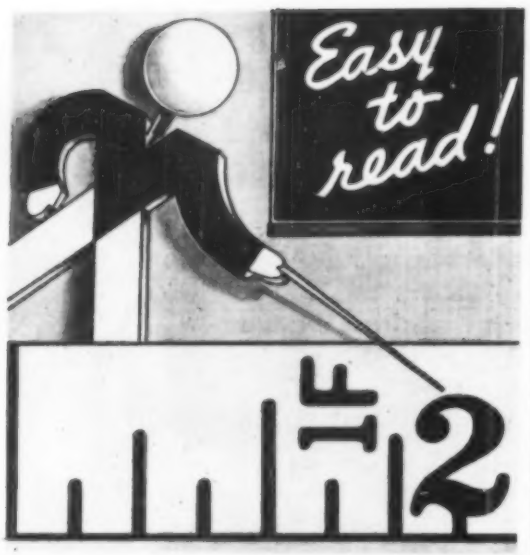

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The full-strength steel in Favorite Wyteface makes it hard to kink, hard to curl. The crack-proof white surface protects the steel from corrosion and rust; it is easy to clean. This new, popular-priced tape is built for a long life of hard usage.

Favorite Wyteface Tapes are sold by building material and hardware dealers. 25, 50, 75, and 100 ft. lengths; sturdy, leatherite case; nickel-plated mountings; simplified center; patented friction brake.

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STEEL MEASURING TAPES

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Send sample and folder on Favorite Wyteface.
Name .....
Address .....
.....

Setting Forms for Bridge Ramp

(Continued from page 47)

four 7/8-in. holes to receive bolts for holding the screw-jacks in place.

Formwork on Jacks — For supporting the formwork on the column brackets and adjusting it precisely to the grade required by the sloping roadway deck, the contractor employed a battery of 222 Simplex ball-bearing screw-jacks, each with a rated capacity of 20 tons, but guaranteed for a 30-ton load. Each jack was specially fitted with a 10x7½-in. malleable iron plate ½ in. thick, welded to its base, and bored with four holes for bolted connections with the shelf of the column bracket. The cap of each jack consisted of a second welded plate designed for a 3-deg. "float," to take care of lateral tilt in the application of the load of the forms carried by the I-beams supporting them.

The screw-jacks on their column brackets served as points of end support for 16-in. steel I-beams which carried the load of the forms and spanned the 19-ft. 9-in. distance between column centers. Between pairs of these 16-in. I-beams, 8x12-in. timbers, set as shown in one of the drawings, served as stringers to carry the forms for bottoms of the concrete girders of the viaduct floor system. The sides of the concrete girders were formed by pans of 3/32-in. sheet steel bent in the shape of an inverted U.

With the form assembly completed for each bay of the viaduct the screw-jacks then were operated to raise or lower the ends of each unit until its position conformed exactly to the grades specified for the sloping roadway deck. The range of vertical form adjustment offered by each jack was 5½ in.

Concrete for the viaduct roadway was delivered in buckets by crawler crane. After the forms were stripped the bolts holding the temporary brackets which carried the screw-jacks were unscrewed, the brackets removed and the bolt holes filled with grout to produce a smooth finish on the faces of the columns.

Personnel — For the Department of Public Works of New York City, Samuel Hamburger, engineer of bridge construction, is in general charge of the project, with N. Deutschman as resident engineer. Field operations for Reiss & Weinsier, Inc., contractors of Brooklyn, N. Y., are directed by Randolph Weinsier and Jack Sloan.

George Washington Bridge Approach

(Continued from page 51)

on the deck to finish the underside of the arch.

Falsework Erection—A crew which varied from ten to 50 men erected the falsework in the north position in four weeks, handling the timbers with winches on top of the existing bridge. The falsework contained almost 200,000 b.-ft. of lumber. Three electric drills operated steadily for three weeks putting in holes for 7,000 ¾-in. bolts required in the fabrication. Nuts were tightened against cast-iron washers with socket wrenches.

Arch Forms — All formwork in the contract, including the arch deck on the falsework, was lined with 5/8-in. plywood, of which the contractor had 60,000 sq.ft. on the job. The plywood gave a general average of eight uses. In the arch deck, the plywood rested on 3x12-in. joists on 12-in. centers, each joist capped with a curved strip cut to the curvature of the arch. Between the top of the falsework posts and the lower edge of the joists was a system of blocks and wedges which permitted adjusting the deck to accurate elevation and, later, lowering the centering.

Ring Stone — A difficult feature of the arch construction is indicated by an accompanying isometric view at the skewback, which shows ring stones for arch face and intrados cast monlithically with the arch barrel. A photograph reproduced with these notes shows the stone set in position on the arch centering prior to the placing of reinforcing steel and concrete. The architectural design calls for 31 ring stones in the face and intrados. Stones in the face ring decrease gradually in depth from 12 ft. at the skewbacks to 8 ft. at the crown; intrados stones are uniformly 8 ft. deep. Each stone is anchored by four cramp anchors to the concrete.

Placing Concrete — An accompanying drawing shows the procedure followed in concreting an arch. The arch barrel was separated into nine blocks, with transverse keys at the skewbacks and between the blocks. Concrete was placed in the blocks to the full width of the arch barrel. The volume of concrete required ranged from 300 cu.yd. in the crown block to 150 cu.yd. in the side blocks. Concrete in 1⅛-yd. batches was mixed 1½ min. at mixing plants set up alongside the abutments and was elevated by tower hoist buckets to scaffold runways over which it was wheeled to place. The concrete was compacted by hydraulic vibrators.

Separate mixing plants served the two arches. A single plant could meet one day's requirements of 300 cu.yd. in 7 hr.

Arch Settlement — In designing the falsework, the contractor's engineer estimated column shortening, settlement at splices, bite at caps and wedges, deflection of steel girders, column shortening under steel, and footing settlement, adding up the various values for each column to provide for estimated settlement under full load. Actual settlement agreed closely with the estimates used in the design. Posts were cut square to give full bearing at all joints. In a few cases where cuts at the bottoms of the columns were not exactly square, it was noted that the posts bit into the sills.

Ring stone in the north arch was set with a 3/8-in.

(Continued on page 104)

Tops Them All
in Power and Gas Savings!

• THE TRUCK OF VALUE •

General Motors Trucks top them ALL—with more power *in every model* and with higher mileage per gallon of gas! GMC's "walk away" with *any* load, light or heavy. And GMC's return from every trip with more gas left in their tanks than other trucks working under like conditions. Why, you ask, can a GMC *DO* more and *SAVE* more? It's simple. GMC's SUPER-DUTY valve-in-head engines pack more driving punch because of exclusive POWER-PAK pistons operating under new-design combustion heads. The result is a higher torque, sustained throughout the useful driving range, and an amazing utilization of every atom of gas fed to the cylinders. *DRIVE* a GMC—see how it *pulls*—and *measure the miles per gallon!* You'll be *convinced!*

GMC Presents
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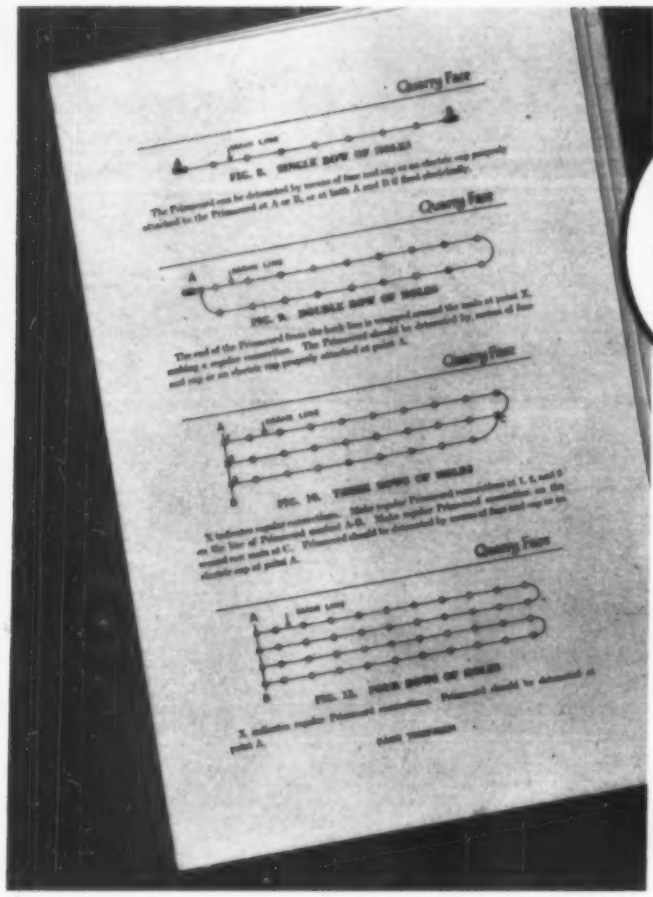
GMC TRUCKS TRAILERS - DIESELS


Quarry Face
FIG. 8. SINGLE ROW OF HOLES
Quarry Face
FIG. 9. DOUBLE ROW OF HOLES
Quarry Face
FIG. 10. THREE ROWS OF HOLES
Quarry Face
FIG. 11. FOUR ROWS OF HOLES

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PB 10

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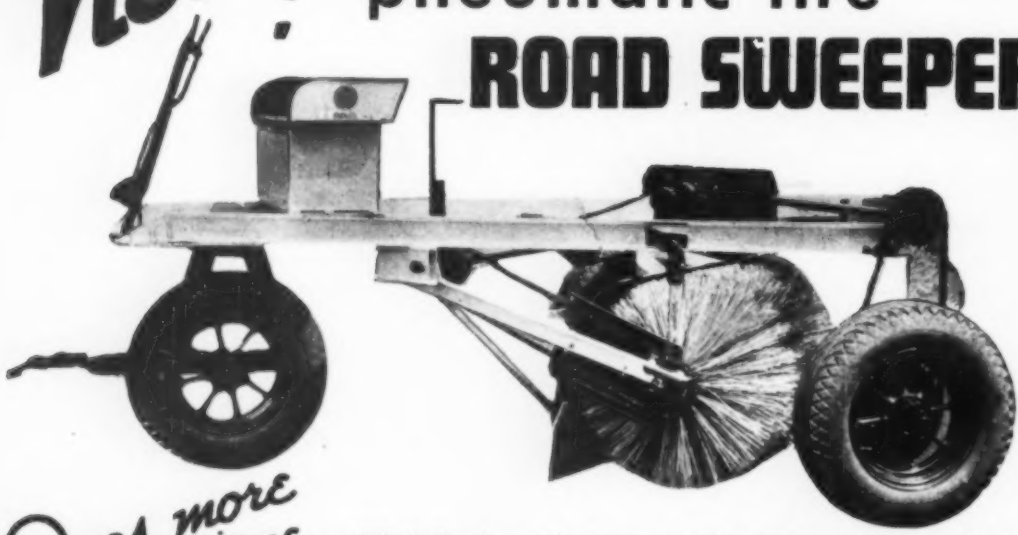

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(Continued from page 102)

joint between stones. As concreting of successive blocks produced settlement in the falsework, the ⅜-in. joint at the keys closed up tighter than expected. To avoid this effect in the south arch, the joints between ring stones at the keys were increased to ⅜ in., and lead fillers were placed in these joints to squeeze out as the falsework settled. Because the ring stone for this arch had already been cut and delivered to the job, the Port Authority permitted the contractor to raise the crown about 3½ in. in order to lengthen the arch 2½ in. and accommodate wider joints at the ten keys. The desired spacing was gained without sacrifice in appearance of the completed arch.

Progress of Arch Construction — Erection of falsework for the north arch started July 6, 1938. Haunch blocks (Sec. 1 of the accompanying drawing) were concreted on Oct. 3, and Sec.'s. 2, 3, 4, and 5 on the four following days, Oct. 4 to 7. Specifications required a 3-day wait before keys could be poured. Keys 6, 7, 8, and 9 were closed Oct. 10, and the final keys at the skewbacks were placed Oct. 11.

After building concrete bent walls on the arch, the contractor began preparations to move the falsework on Oct. 28. On Nov. 4, the falsework was rolled to the south position. A small crew spent 10 days in replacing the steel girder spans in their new location under the falsework and in blocking the centering to accurate elevation. After setting stone on the centering, the contractor concreted Sec. 1 blocks of the south arch on Dec. 12; Sec. 2, Dec. 13; Sec. 3, Dec. 19; and Sec. 4 and 5, Dec. 20. Bad weather caused lost time on this arch. The keys were completed Dec. 30.

Contract Quantities — In addition to the two arch spans over Riverside Drive and the sections of approach ramps supported on the arches, the contract called for extending the ramps eastward about 900 ft. to a plaza, completing the existing central ramp to the portal of a vehicular tunnel (not previously used) and reconstructing the tunnel portal, building a pedestrian underpass under Riverside Drive, and facing and completing the anchorage of George Washington bridge, adjacent to and west of the concrete arch spans. The entire contract, valued at nearly $1,100,000,000, involves about 30,000 cu.yd. of concrete, 1,400 tons of reinforcing steel, 1,600 tons of structural steel, 3,500 cu.ft. of cut granite, 37,000 sq.ft. of sawn granite, and 64,000 sq.ft. of rubble ashlar masonry, in addition to numerous other items.

With the exception of sawn granite used in the arch rings and on the west (river) face of the anchorage, granite rubble ashlar was specified for the facing of these structures. Walter Kidde Constructors, Inc., subcontracted stonework to Albert G. MacInnis, New York City, and fabrication and erection of structural steel to the Bethlehem Steel Co., New York City.

Administration — Additions to the New York approach to the George Washington bridge are being constructed under the direction of the Port of New York Authority: O. H. Ammann, director of engineering; J. C. Evans, chief engineer; and Charles S. Gleim, engineer of construction. Operations at the site are supervised for the Port Authority by R. F. Wheadon, resident engineer.

For Walter Kidde Constructors, Inc., general contractor, New York City, Charles W. Knowles is general superintendent, Nikolai Pedersen is superintendent in charge of the job, and J. Rhodes Smith is engineer. Mr. Smith designed the falsework.

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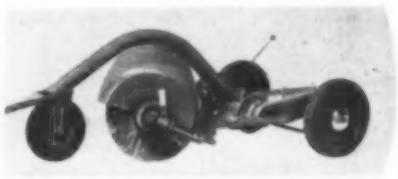

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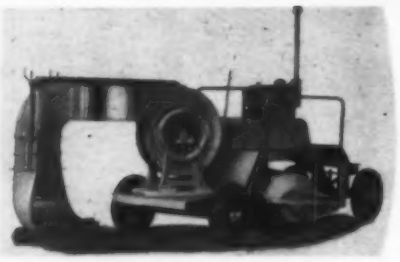
Hough Tractor Sweeper



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Prefabricated Timber Bridge

(Continued from page 63)

and 4 ft. thick, weighing about 19 tons, was the most interesting part of the job. This work was awarded by the Parker-Schram Co., contractor, to the Arch-Rib Construction Co., of Portland, Ore., fabricators and engineers of timber structures.

Simplified joint details made possible by timber connectors permitted rapid shop fabrication of all parts and subsequent assembly of the trusses following a vacuum-pressure treatment of Wolman salts in the Wauna, Ore., plant of the American Lumber & Treating Co. Fabrication required 22,000 Teco ring connectors.

After fabrication, the eighteen trusses required for the nine spans were loaded on three barges and floated down the Columbia River to the bridge site. A floating derrick raised the trusses and placed them in position on treated timber towers set on concrete pier bases in the river. There are eight such towers, each tower decreasing in height from the four steel spans to where the nine wood truss spans meet the seventeen timber trestle bents at the Puget Island end of the bridge. On top of the trusses are 12x24-in.x28-ft. floor beams, eleven to each truss, connecting across the bridge. Atop these floor beams are 3x6-in. treated bridge decking laid lengthwise of the bridge and covered in turn with an asphalt wearing surface.

The bridge is being erected by the Washington State Highway Commission with PWA funds. Parker-Schram Co., Portland, Ore., is the contractor, and the structure was designed by L. V. Murrow, director, and R. W. Finke, bridge engineer, for the Washington Highway Commission. Timber connectors were furnished by the Timber Engineering Co. of California. Accompanying photographs were supplied by the Crossett Western Co., Wauna, Ore., which manufactured much of the lumber for the bridge.

VERMONT ROAD GRADING

(Continued from page 65)

a 12-yd. scraper drawn by tandem 95-hp. tractors excavating a wet clay pocket after hard rains. Despite the soupy character of the clay, the scraper was able to complete excavation of the clay pocket in the face of adverse conditions. The pocket was about 200 ft. long, and clay had to be removed to a depth of about 3 ft. 4 in. Excavation and filling of one-half of the pocket had been completed in advance of the rain. The wet weather was not permitted to stop the work, and the scraper continued excavation until the clay was completely cleaned out and replaced by gravel.

Ample provision for surface drainage and sub-

(Continued on page 108)

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(Continued from page 106)

drainage characterizes the entire project, and the treatment of clay pockets illustrates this fact. At the clay pocket just described, for example, the engineers called for construction of bleeder trenches excavated to the depth of the gravel backfill and filled with gravel to drain the fill on the low side of the road. On the upper side of the road, an underdrain of 6-in. corrugated perforated asphalt-coated metal pipe was buried about 3 ft. below the bottom of the gravel backfill. Straight runs of pipe were used for all underdrains on the job, as experience has shown that bends and tees are likely to clog.

Diesel Equipment — Practically all power units of the contractor's plant was diesel equipped. In addition to the five diesel tractors already mentioned nearly all other grading equipment was powered by diesel engines.

On ledge excavation, two 330-c.f.m. compressors (Gardner-Denver and Sullivan) powered by Caterpillar diesels supplied air to drifter drills (Gardner-Denver and Ingersoll-Rand) on three-wheel wagon mountings. A diesel-driven Bucyrus-Erie 1½-yd. shovel loaded broken rock into four Linn track-type tractor trucks powered with Cummins diesel engines. These trucks served also to haul spoil excavated by a Bucyrus-Erie ⅜-yd. convertible utility unit, equipped with any one of three attachments to function as a backhoe, crane or shovel.

Fill material was spread by bulldozers in successive layers of not more than 12-in. depth for compaction of earth-moving equipment. One of the 95-hp. diesel tractors was equipped with a bulldozer blade for alternate operation on fills. A Caterpillar 50-hp. diesel tractor with a LaPlant-Choate bulldozer attachment worked on cut slopes, pushing material down to the scrapers on the bottom. During the early part of the job, an International 40-hp. diesel tractor-bulldozer supplemented the 50-hp. unit in cuts and on fills.

Muck Excavation—About 2,500 cu.yd. of muck was included in the common excavation item for the job. The muck was removed by the 1½-yd. shovel or by the ⅜-yd. utility unit operating a clamshell bucket. Where bad ground was encountered at culvert locations, the soft material was excavated and the culvert was placed on gravel fill. If the foundation condition could not be corrected in this way, the culvert was built on a timber mat.

Blasting Rock Ditches — An interesting item of the specifications, for drilling and blasting of solid rock ditches, required that in all rock cuts holes be drilled along the ditch line to a depth of 7 ft. below ditch grade. Average spacing for the holes was 1 ft. longitudinally (staggered) and 1 ft. 3 in. transversely. Following the drilling, sufficient dynamite was blown in each hole to shatter the ledge rock to the full depth of the holes. After blasting, no rock was removed below ditch grade, but the ditch was graded to required section. The work was paid for at the contract unit price per linear foot for drilling and blasting of solid rock in ditches. Ditch blasting is expected to provide for better drainage of gravel sub-base and for interception of groundwater.

Direction — Hubert E. Sargent is commissioner of highways and chief engineer of the Vermont Department of Highways. Construction operations are under the direction of F. C. Coates, construction engineer. On the contract section here described, R. H. Arnold is resident engineer in charge of the project.

For the Lane Construction Corp., contractor, Meriden, Conn., F. L. Bowen, superintendent, directs operations on the job.

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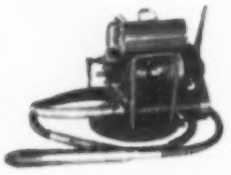
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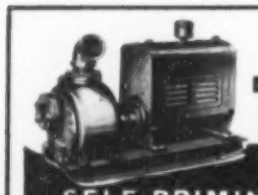
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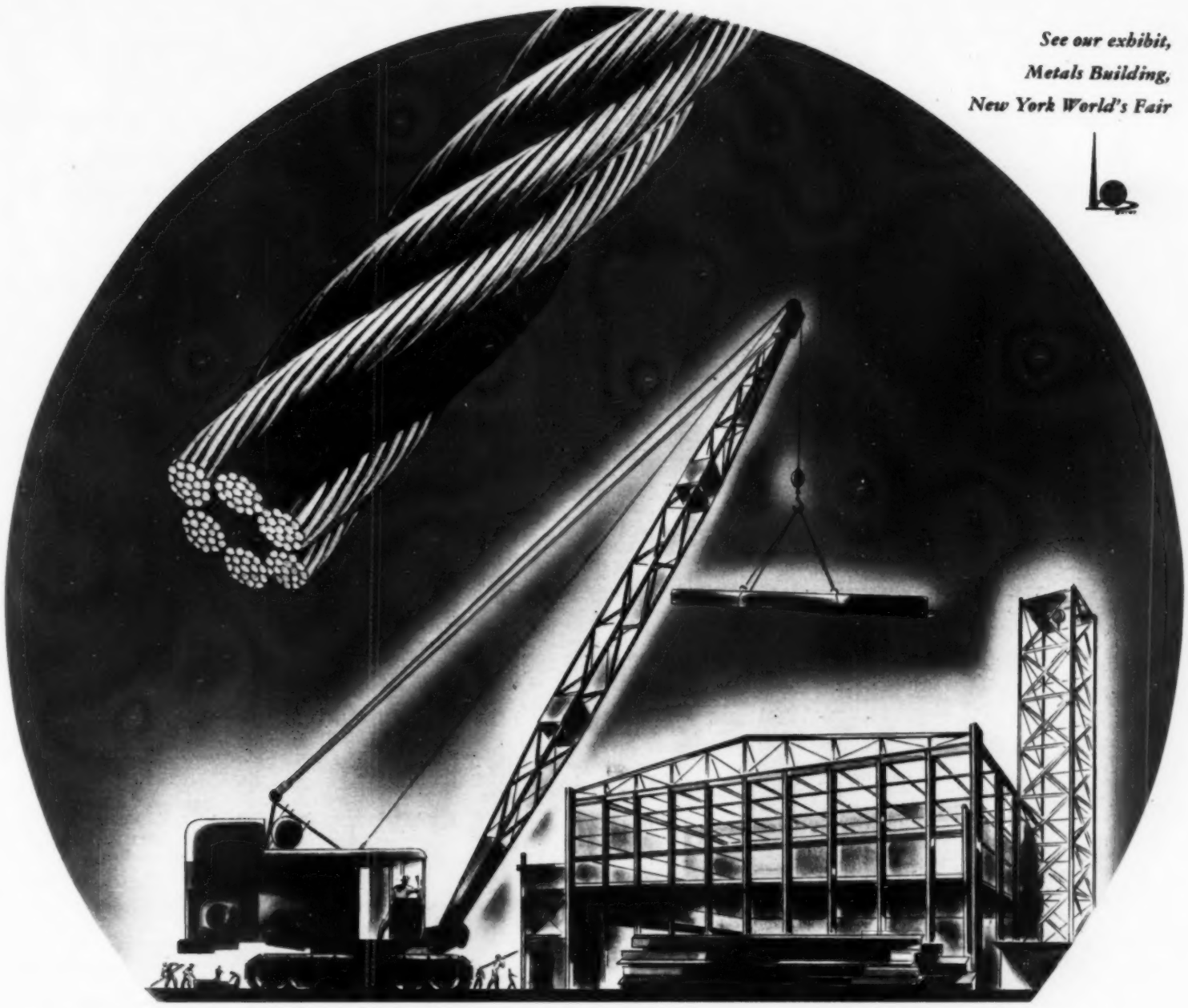

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WILKES-BARRE, PENNSYLVANIA
District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

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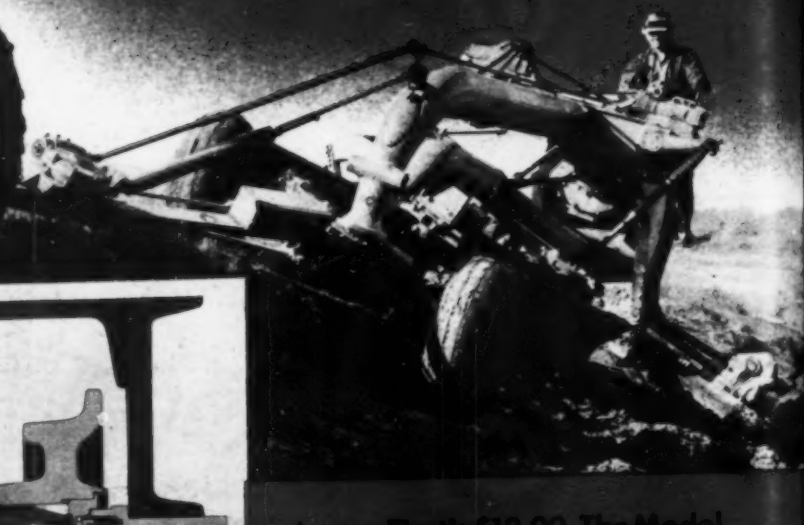
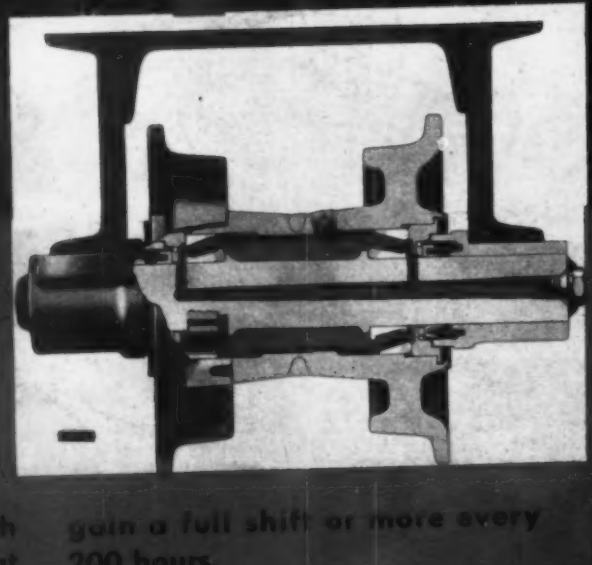
NEW! GREATEST ADVANCE IN MODERN TRACK CONSTRUCTION

POSITIVE-SEAL TRUCK WHEEL ASSEMBLY

Daily Lubrication No Longer Necessary ... New Positive-Seal Idlers and Truck Wheels on Model "S" Tractors Require Oil Only Once in 200 Hours ... Solve Biggest Track Maintenance Problem.





Greatest time and money-saving advance in modern tractor construction—Allis-Chalmers Positive-Seal Truck Wheel Assembly on the Model "S" (64 H.P. gas tractor). Ordinary bearings are replaced by tapered roller bearings with a positive-seal arrangement that keeps in lubricating oil and keeps out dirt, dust, mud and grit. Lubrication is required only once in every 200 operating hours.

Here's what this great, new positive-seal truck wheel assembly means to you:

EXTRA WORKING HOURS—No longer need you take a half hour out of each shift for greasing. You gain a full shift or more every 200 hours.

LESS TRACK MAINTENANCE—Dirt, mud and grit are sealed out and truck wheel life prolonged. Again you gain working hours because costly shutdowns for truck wheel repair are eliminated.

LOWER LUBRICATION COSTS—Ordinary 60-70 H.P. tractors require 7½ lbs. of grease every ten hours or 150 lbs. @ 8c per lb. in 200 hours. That's $12.00. The Model "S" takes only 2¼ gals. of 50c lubricating oil in 200 hours. Cost $1.12. You gain $10.88.

Take advantage NOW of these gains in working time...these savings in maintenance and lubricating. See for yourself . . . on your own job . . . what this big, fast-moving tractor can do. Ask your Allis-Chalmers dealer to demonstrate.

YOU SAVE ENOUGH ON FIRST COST ALONE WITH THE MODEL "S" TO BUY FUEL FOR A YEAR.

ALLIS-CHALMERS POWER

TRACTOR DIVISION—MILWAUKEE, U.S.A.

TRACTORS, ENGINES, ROAD MACHINERY

IT DOESN'T COST .. *it Pays!*